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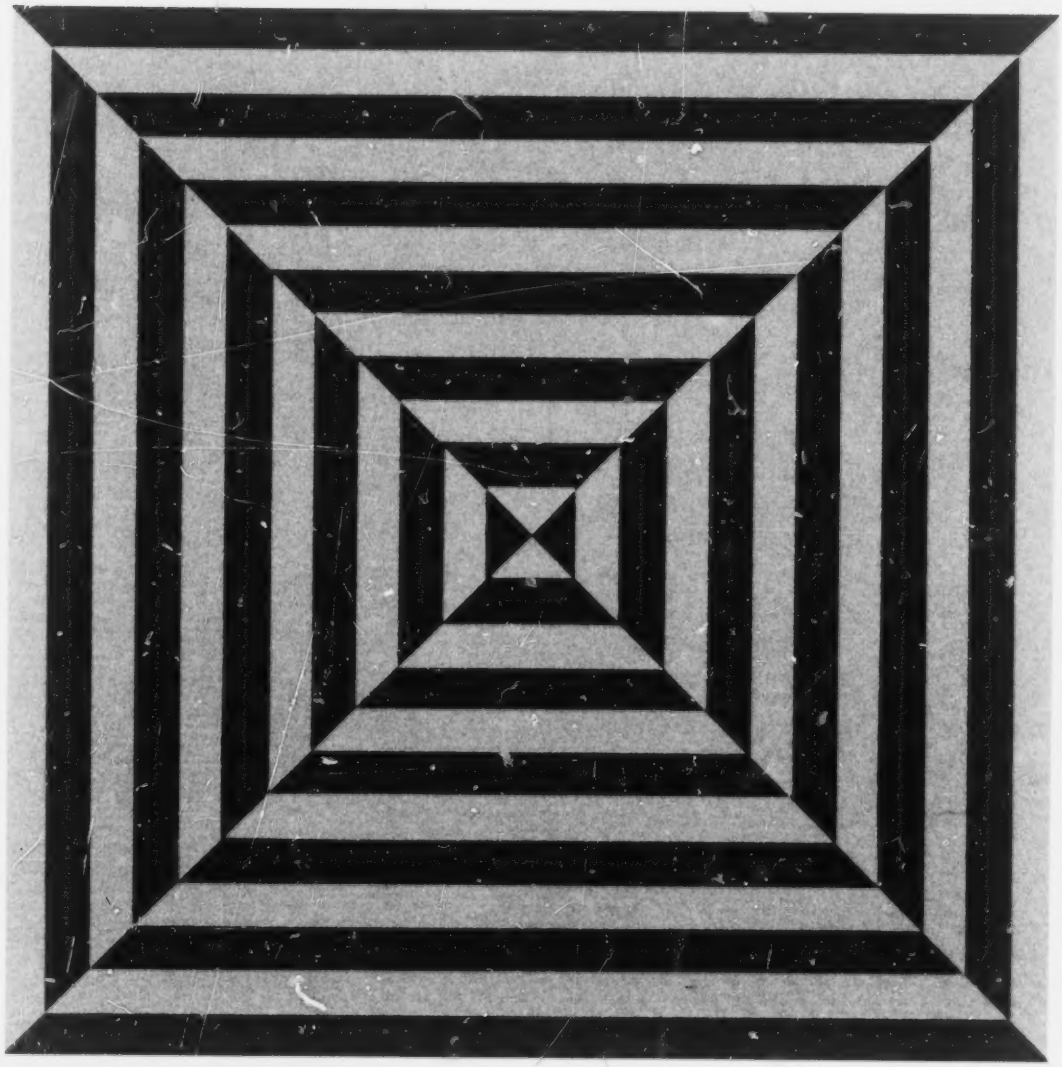
RECRUITMENT AND RETENTION OF FULL-TIME ENGINEERING FACULTY, FALL 1980

Frank J. Atelsek and Irene L. Gomberg



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Recruitment and Retention of Full-Time Engineering Faculty, Fall 1980

Frank J. Atelsek
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As ever we are indebted to our campus representatives who helped coordinate this survey effort and the deans and department heads who provided information or responded to it.

Highlights

Faculty Positions

- As of fall 1980, there were approximately 16,200 permanent full-time engineering faculty positions in the 244 institutions with at least one accredited engineering program.

- Public universities had an average of 20 faculty positions per engineering field; private universities had 15 per field; public four-year colleges, 10 per field; and private four-year colleges, 6 per field.

- The 50 institutions with the greatest engineering R & D expenditures accounted for 45 percent of all permanent full-time engineering positions.

Vacancies

- Almost 10 percent of full-time engineering faculty positions were unfilled at the beginning of the fall 1980 term; of these, 45 percent had been vacant since fall 1979.

- The top 50 institutions in engineering R & D spending had a vacancy rate of 8 percent, compared with a rate of 11 percent at all other institutions.

Recruiting and Retaining Faculty

- Over half of all institutions reported a substantial decrease in their ability to recruit or retain engineering faculty over the past five years; that proportion was 64 percent at public institutions and 29 percent at private institutions.

- Among institutions with decreased ability to recruit or retain engineering faculty, 80 percent reported that such staffing difficulties had led to increased teaching loads; 66 percent reported greater reliance on teaching assistants or part-time faculty; and 54 percent reported an inability to offer courses in certain subjects.

- Among institutions that reported decreased ability to recruit or retain engineering faculty, 76 percent reported a consequent decrease in the quality of research and 82 percent believed that the quality of instruction had declined.

- During 1979-80, almost 400 full-time engineering faculty voluntarily left academia for full-time employment in industry, representing 2.7 percent of the permanent, employed faculty.

- About 9 of every 10 deans thought that competition with industry for faculty had increased during the past five years.

Background

In recent years education in engineering has taken some curious turns. Between 1975 and 1980, engineering baccalaureates increased by more than 50 percent while doctorate degree production fell by 12 percent. These trends pose a serious problem for the engineering colleges. The supply of new teachers continues to decrease at the very time student enrollments are continuing to set record levels. Academia's resulting difficulties in employing adequate numbers of faculty are aggravated by competition from industry which often pays engineering doctorates much more than do colleges and universities. The primary purpose of this survey is to assess the extent of faculty vacancies in colleges of engineering, the effects of such vacancies upon research and instructional programs, and the nature of the competition between academia and industry in hiring engineering faculty.

The survey's focus is on permanent full-time faculty positions in seven major engineering fields: aeronautical and astronautical, chemical, civil, computer science and computer engineering, industrial, and mechanical engineering. Institutions were asked to report the total number of faculty positions in each of these fields and the number that were unfilled at the beginning of the 1980 fall term, as well as those vacant since the start of the 1979 fall term. The deans also were asked for their assessments of the extent and effects of competition with industry upon their engineering colleges. The specific questionnaire items on which this survey report is based appear in Appendix A.

Methods Summary

The Higher Education Panel is an ongoing survey research program created in 1971 by the American Council on Education to conduct specialized surveys on topics of current policy interest to the higher education community and to government agencies.

The Panel is a stratified sample of 760 colleges and universities drawn from the population of more than 3,000 institutions listed in the National Center for Education Statistics' Education Directory. All institutions in this population are grouped in terms of the variables constituting the Panel's stratification design, which is based primarily on type (universities, four-year colleges, two-year colleges), control (public, private), and size (full-time equivalent enrollment). For any given survey either the entire Panel or an appropriate subgroup is used.

The survey instrument (see Appendix A) was mailed on October 15, 1980, to the 181 four-year colleges and universities in the Panel that in 1979 had at least one engineering program accredited by the Engineers' Council for Professional Development. Engineering deans were asked to provide, by specific engineering field, information on faculty vacancies, perceptions about competition with industry, and opinions regarding the effect of any difficulty in recruiting or retaining engineering faculty.

After mail and telephone follow-ups, usable responses were received from 159 institutions, for a response rate of 88 percent. Data from responding institutions were statistically adjusted to represent the national population of 244 colleges and universities with accredited engineering programs. The stratification design, weighting procedure, and comparison of respondents and nonrespondents are contained in Appendix B.

Findings

Faculty Positions

In the fall of 1980, the engineering fields covered by the survey had a total of 16,200 permanent, full-time faculty positions. As shown in Figure 1, the number of positions varied widely among the fields, ranging from a high of 3,570 full-time positions in electrical engineering to a low of 650 in aeronautical/astronautical engineering departments.

Almost 10 percent of full-time positions were unfilled, or filled with visiting or other temporary faculty, at the beginning of the 1980 fall term. Of these unfilled positions, 45 percent had been vacant since the fall of the previous year (1979). Figure 2 shows how each of the surveyed engineering fields fared in filling their available permanent faculty positions.

The aeronautical and astronautical engineering fields had only 4 percent of positions unfilled in fall 1980. In contrast, computer science and computer engineering reported vacancies of 16 percent in their permanent faculty positions, and more than half of these had been vacant at least since the fall of 1979. Industrial engineering departments also had an above average proportion of unfilled faculty positions. The other engineering fields in the survey--chemical, civil, electrical, and mechanical--had vacancy proportions near the overall level for all fields combined.

To determine whether the problems of recruiting and retaining engineering faculty were more acute in some institutional settings than others, separate tabulations were prepared for universities and four-year colleges, public and private institutions, and for the 50 institutions having the heaviest involvement in engineering R & D activity.

The top 50 institutions in terms of FY79 engineering R & D expenditures accounted for 45 percent of the approximately 16,200 permanent positions at the 244 institutions covered by the survey. The distribution of permanent faculty positions among the engineering fields at the top 50 institutions was roughly

Figure 1

Permanent Full-Time Engineering Faculty Positions, by Engineering Field, Fall 1980

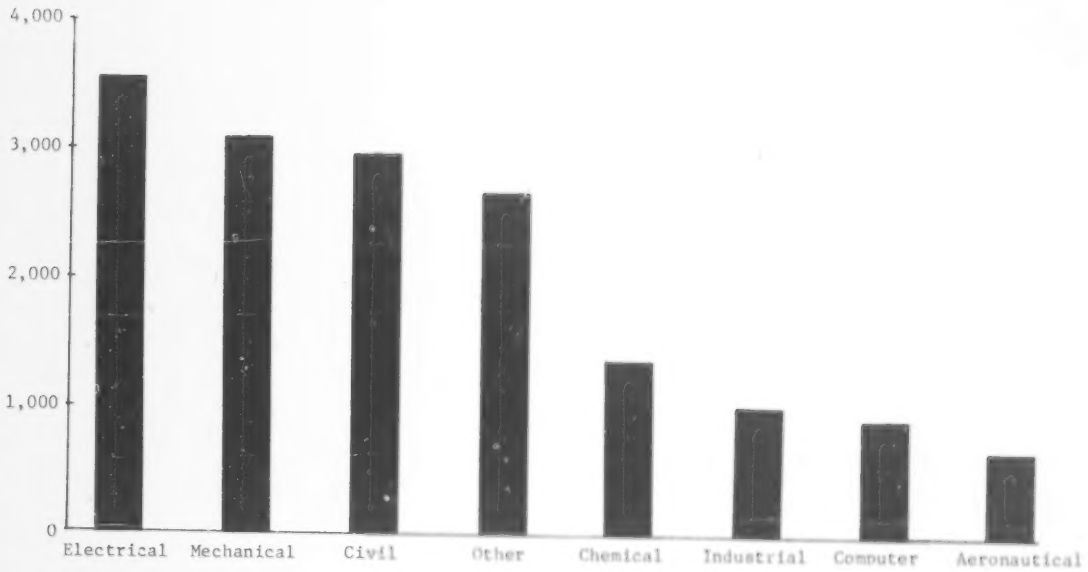
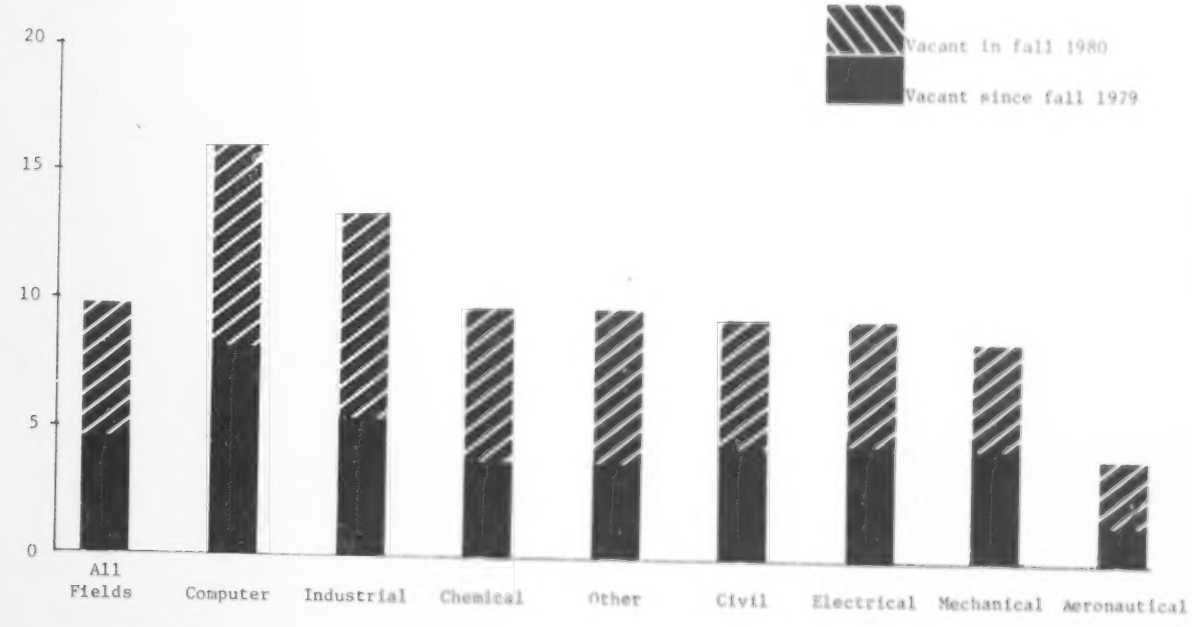


Figure 2

Engineering Faculty Vacancies as a Percentage of All Engineering Faculty Positions, Fall 1980



similar to that of other institutions, except that proportionately more top 50 positions were in aeronautical/astronautical engineering and "other" engineering fields which could not be readily classified under the specified engineering categories.

Overall, the top 50 institutions exhibited somewhat less difficulty in keeping their permanent full-time faculty positions filled. Vacancies accounted for 8 percent of their total positions, compared with a vacancy rate of over 11 percent at all other institutions. This pattern of lower vacancy rates at the top 50 institutions persisted in almost all the engineering fields listed. The difference was most notable in industrial engineering (9 percent vs. 17 percent). The top 50 institutions also had proportionately fewer long-term vacancies (i.e., unfilled since fall 1979).

Almost three-fourths (11,900) of the full-time engineering positions were at the 151 public institutions covered by the survey. Overall, vacancy rates at the beginning of the 1980 fall term were higher at public institutions, 11 percent vs. 8 percent for private institutions. This pattern of difference held in each of the surveyed engineering fields.

Since the mix of universities and four-year colleges offering engineering programs was different in the public and private sectors, it was advisable to separate and examine these elements in more detail. Table A[1] compares public and private institutions; detailed report tables show the data by field and by type and control of institution.

The proportion of positions that remained unfilled in fall 1980 was somewhat higher at public than at private universities in all fields but chemical and civil engineering. It is also notable that the public-private difference in vacancy rates was relatively small. In only one instance was the spread in vacancy rates greater than two percentage points: industrial engineering vacancies were 2.5 percent greater at

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[1]Summary tables, identified by letters, appear throughout the text. Detailed report tables, identified by numerals, begin on page 14.

public universities. Moreover, the difference in the longer term vacancy percentages was even smaller, approaching two percentage points in only two instances.

Table A

Unfilled Faculty Positions as a Percentage of All Full-time Engineering Faculty Positions

	All Institutions	Public Institutions	Private Institutions
Positions unfilled as of Fall 1980	9.8	10.5	7.7
Positions unfilled since Fall 1979	4.4	4.5	4.1

Recruiting and Retaining Faculty

The survey included a number of questions about how competition with industry has affected the colleges and universities. One question asked the engineering deans to assess how their ability to recruit and retain faculty had changed over the last five years. Table B summarizes their responses. Overall, half of the institutions reported there had been a substantial decrease in their ability to recruit and retain engineering faculty. An additional 37 percent reported a moderate or slight decrease in their ability to compete for faculty.

Table B

Perceived Change in Ability to Recruit and Retain Engineering Faculty, By Degree of Change

Degree of Change in Ability to Recruit	All Institutions	Public Institutions	Private Institutions
All degrees of change	100%	100%	100%
Substantial decrease	51	64	29
Slight or moderate increase	37	27	56
No change	5	1	12
Slight or moderate increase	3	3	3
Substantial increase	4	5	0

The deans' perceptions of their ability to compete differed markedly among public and private colleges and universities. Nearly two-thirds of those at public institutions said their ability was substantially decreased, compared with less than one-third of those at private institutions.

Effects of Staffing Problems

A follow-up question for institutions reporting a decrease in ability to obtain and hold full-time faculty asked about the specific effects of their staffing problems. Of the specific effects listed in the question, a preponderant majority (80 percent) pointed to a consequent increase in teaching loads (see table C). Two-thirds mentioned the necessity of greater reliance on graduate teaching assistants or part-time faculty, and

Table C

Effects of Decreased Ability to Recruit or Retain Full-time Engineering Faculty

	All Institutions
Increase in teaching loads	80%
Greater reliance on graduate teaching assistants or part-time faculty	66
Inability to offer courses in certain subjects	54
Reduction in faculty research	35
Other effects	21
No significant effects as yet	8

more than half (54 percent) were required to reduce their course offerings in certain subjects. About a third also pointed to a reduction in faculty research as an effect of their decreased competitive position.

Finally, about one-fifth of the institutions mentioned other effects that were not cataloged in our questionnaires. These included lowered morale, restraints in program development, longer student waiting lists, increases in foreign faculty with attendant language difficulties, reduced personal and academic guidance of students, and changes in the character and quality of instructional programs, particularly with respect to indi-

vidual instruction and small group interaction.

Another specific question asked whether the respondents believed that the quality of research and instruction in their engineering colleges had decreased because of the difficulty in recruiting or retaining full-time faculty. Overall, three-fourths of the deans who reported greater staffing problems saw resulting decreases in the quality of research, and four-fifths detected a decrease in the quality of instruction. (See table D.)

Table D

Perceived Change in Quality of Research and Instruction at Institutions Reporting Decreased Ability to Recruit Engineering Faculty

	Percentage Reporting Change of Quality in	
	Research	Instruction
All responses	100%	100%
Decrease in quality	75	82
Slight decrease	(40)	(41)
Moderate decrease	(29)	(31)
Great decrease	(6)	(10)
No decrease in quality	25	18

Another item asked what proportion of full-time junior faculty (assistant professors and instructors) who held permanent full-time positions in engineering colleges had not received their bachelor's degree in the United States. Table E shows that almost one-fourth of the junior faculty received their undergraduate degrees outside the United States. While not a direct indication of faculty shortages, the results do indicate that engineers from other countries have prevented shortages from becoming even more severe.

Table E

Full-time Junior Engineering Faculty
Who Did Not Receive Their Baccalaureates in the U.S.

	Total Junior Faculty	% With Bacc. From Outside U.S.
All institutions	3,400	24
Public institutions	2,400	25
Private institutions	1,000	20

Faculty Leaving for Industry

Another factor that contributes to vacancies among engineering faculty positions is the extent to which full-time faculty members shift from teaching careers to other assignments in industry. Table F shows the number of full-time engineering faculty who voluntarily left academia for full-time employment in industry during the 1979-80 school year. The question attempted to focus on faculty who were drawn away by the perceived benefits of employment in industry. Excluded from this count were those faculty who were denied reappointment for any reason, including failure to receive tenure. Those who left because they anticipated not receiving tenure also were excluded from this count.

Overall, almost 400 engineering faculty voluntarily left full-time academic positions at the 244 institutions under study for jobs in industry during 1979-80. For the year, these losses to industry represented about 2.7 percent of the 14,600 permanent faculty who were employed in fall 1980.

Table F

Full-time Engineering Faculty Who Left Voluntarily
For Full-time Employment in Industry

	Voluntary Departures	
	Number	As a % of Total Faculty
All Fields	37	2.7
Aeronatuical & astronautical engineering	12	1.9
Chemical	32	2.6
Civil	61	2.3
Computer science & computer engineering	43	5.6
Electrical	89	2.7
Industrial	24	2.8
Mechanical	78	2.7
Other engineering fields	58	2.4

Table F shows the extent of voluntary faculty departures to industry for each of the engineering fields covered in the survey. Notably, the computer science and computer engineering field lost the largest proportion of its faculty to industry (5.6 percent). This field also had the largest proportion of unfilled permanent positions (16 percent).

There was near unanimity in the respondents' views of the change in the degree of competition with industry over the past five years (table G). None believed that competition with industry had decreased at their college of engineering. Ninety percent reported an increase in competition and only 10 percent reported no change. Feelings that competition had increased were especially high at public universities (95 percent) and lowest among the private universities (82 percent).

Table G

Perceived Change Over the Past Five Years in the Degree of Competition With Industry for Engineering Faculty

	Competition Increased	No Change	Competition Decreased
Public			
Universities	95%	5%	0
Four-year colleges	88	12	0
Private			
Universities	82	18	0
Four-year colleges	92	8	0
Total	90	10	0

Institutions that reported increased competition with industry were asked to specify the chief reason for the increase. The distribution of responses is summarized in table H.

Superior salary and financial benefits in industry were cited as the chief reason by 76 percent of the institutions overall. An additional 15 percent attributed the increase in competition chiefly to declines in the production of new engineering doctorates during recent years. Only 5 percent cited better opportunities for advancement and recognition as the primary reason behind the increased competition.

A number of respondents were reluctant to identify one primary reason. Some thought most or all of the listed reasons were important factors in the increased competition with industry. A few respondents referred to the better laboratory equipment and facili-

ties in industry. Others referred to a generally inadequate funding base in academia

Table H

Chief Reason for Increased Competition with Industry for Engineering Faculty

	All Institutions
All reasons	100%
Industry offers superior salaries and financial benefits	76
Fewer engineering doctorates have graduated in recent years	15
Industry offers better opportunities for advancement and recognition	5
Other	4

which they felt has eroded educational quality and, therefore, the morale necessary to remain in education despite compensation inducements offered by private industry. One respondent stated that the present survey was too narrowly conceived in that it "overlooks a very serious constraint to recruiting faculty, namely, legislative restrictions in hiring and position control. This is far more serious than competition from industry at this time."

Conclusions

The survey findings indicate that most institutions have been unable to recruit and retain a full complement of well-qualified faculty in many fields of engineering. In consequence, teaching loads have increased, greater reliance has been placed on teaching assistants and part-time faculty, and the range of course offerings has been reduced in certain subjects. Overall, many of the survey respondents believe that the quality of research and instruction in engineering colleges is on the decline.

Other commentators on the "crisis in engineering education" have pointed to additional aspects of the problem of faculty shortages:

-- New tenure-track faculty positions are not being authorized in many colleges, even where such additions could be justified by the growth in number of students enrolled.[2] Recent Panel surveys affirm that college and university administrators are reluctant to take actions that may lead to long-term financial commitments. Increasingly, current staff needs are being met by part-time arrangements outside the traditional tenure system.

-- There is some indication that present shortages of doctoral level engineering faculty are beginning to lead universities and colleges to limit undergraduate enrollments.[3]

-- Industrial salaries are significantly higher than academic salaries. In spite of continuing faculty shortages, the salary structure for engineers in academia has not responded to the normal rules of supply and demand. Colleges and universities often attempt to maintain a general correspondence of salary levels in all disciplines. Thus the short supply and high demand for engineering faculty do not necessarily result in salary levels much higher than in other disciplines where demand for faculty is lower and supply is higher.[4]

While this survey stressed the academic aspects of the engineering manpower problem, industry also suffers from its effects. Obviously, problems associated with shortages of doctoral level engineers are shared by government, industry, and the academic institutions, even if not always equally.

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[2]James G. Knudsen, American Institute of Chemical Engineers, The Crisis in Chemical Engineering Education, p. 2.

[3]Ibid., p. 3.

[4]American Association of Engineering Societies (AAES), Data Related to the Crisis in Engineering Education, March 1981.

Detailed Report Tables

Table 1

Permanent Full-time Engineering Faculty Positions, Fall 1980:
All Institutions (N=244)*

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	649	15	26	4.0	10	1.5
Chemical	1,382	11	136	9.8	53	3.8
Civil	2,907	15	276	9.5	124	4.3
Computer science and computer engineering	914	9	146	16.0	75	8.2
Electrical	3,570	16	333	9.3	168	4.7
Industrial	1,007	10	135	13.4	54	5.4
Mechanical	3,121	15	275	8.8	135	4.3
Other engineering fields	2,658	20	257	9.7	101	3.8
Total positions	16,208	14	1,583	9.8	720	4.4

*Included in this survey were only institutions with at least one engineering program accredited by the Engineers' Council for Professional Development, 1979.

Note: On this and subsequent tables, totals may not add exactly because of weighting and rounding.

Table 2

Permanent Full-time Engineering Faculty Positions, Fall 1980:
Top 50 Institutions*

Engineering Fields	Total Number of Positions	Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
		N	% of total	N	% of total
Aeronautical and astronautical	384	16	4.2	5	1.3
Chemical	680	51	7.5	23	3.4
Civil	1,279	93	7.3	39	3.0
Computer science and computer engineering	369	51	13.8	31	8.4
Electrical	1,443	116	8.0	55	3.8
Industrial	433	39	9.0	9	2.1
Mechanical	1,170	93	7.9	50	4.3
Other engineering fields	1,600	119	7.4	53	3.3
Total positions	7,356	578	7.9	264	3.6

*In level of engineering R & D expenditures, FY79

Table 3

Permanent Full-time Engineering Faculty Positions, Fall 1980:
Public Institutions (N=151)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% total	N	% of total
Aeronautical and astronautical	502	16	22	4.4	7	1.4
Chemical	1,008	11	100	9.9	37	3.7
Civil	2,219	18	211	9.5	83	3.7
Computer science and computer engineering	679	10	115	16.9	58	8.5
Electrical	2,480	19	255	10.3	131	5.3
Industrial	790	11	109	13.8	41	5.2
Mechanical	2,209	17	226	10.2	105	4.8
Other engineering fields	2,028	20	213	10.5	80	3.9
Total positions	11,915	16	1,251	10.5	542	4.5

Table 4

Permanent Full-time Engineering Faculty Positions, Fall 1980:
Private Institutions (N=93)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	147	15	5	3.4	2	1.4
Chemical	374	11	35	9.4	15	4.0
Civil	688	10	65	9.4	41	6.0
Computer science and computer engineering	234	7	31	13.2	18	7.7
Electrical	1,090	13	77	7.1	37	3.4
Industrial	217	7	25	11.5	13	6.0
Mechanical	912	12	48	5.3	31	3.4
Other engineering fields	629	21	44	7.0	21	3.3
Total positions	4,291	12	330	7.7	178	4.1

Table 5

Permanent Full-time Engineering Faculty Positions, Fall 1980:
Public Universities (N=86)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	367	15	20	5.4	7	1.9
Chemical	854	13	74	8.7	37	4.3
Civil	1,718	22	131	7.6	59	3.4
Computer science and computer engineering	436	12	68	15.6	44	10.1
Electrical	1,778	23	160	9.0	84	4.7
Industrial	593	14	68	11.5	24	4.0
Mechanical	1,642	21	142	8.6	71	4.3
Other engineering fields	1,611	25	153	9.4	70	4.3
Total positions	8,999	20	817	9.1	396	4.4

Table 6

Permanent Full-time Engineering Faculty Positions, Fall, 1980:
Private Universities (N=45)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	147	15	5	3.4	2	1.4
Chemical	338	11	35	10.4	15	4.4
Civil	522	15	43	8.2	27	5.2
Computer science and computer engineering	214	10	31	14.5	18	8.4
Electrical	769	20	66	8.6	30	3.9
Industrial	134	9	12	9.0	7	5.2
Mechanical	587	16	41	7.0	24	4.1
Other engineering fields	629	21	44	7.0	21	3.3
Total positions	3,341	15	278	8.3	144	4.3

Table 7

Permanent Full-time Engineering Faculty Positions, Fall 1980:
Public Four-Year Colleges (N=65)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	135	20[a]	2	1.5	0	0
Chemical	154	5	26	16.9	0	0
Civil	501	10	80	16.0	24	4.8
Computer science and computer engineering	243	8	47	19.3	14	5.8
Electrical	702	13	95	13.5	47	6.7
Industrial	197	6	41	20.8	17	8.6
Mechanical	567	11	84	14.8	34	6.0
Other engineering fields	417	10	60	14.4	10	2.4
Total positions	2,916	20	434	14.9	146	5.0

[a]Distorted somewhat due to the inclusion of faculty from a U.S. Service School.

Table 8

Permanent Full-time Engineering Faculty Positions, Fall, 1980:
Private Four-Year Colleges (N=48)

Engineering Fields	Number of Positions		Positions Unfilled at Beginning of 1980 Fall Term		Positions Unfilled Since Beginning of 1979 Fall Term	
	Total	Avg. Per Dept.	N	% of total	N	% of total
Aeronautical and astronautical	0	0	0	0	0	0
Chemical	36	7	0	0	0	0
Civil	166	5	22	13.3	14	8.4
Computer science and computer engineering	20	2	0	0	0	0
Electrical	321	7	11	3.4	7	2.2
Industrial	83	6	13	15.7	6	7.2
Mechanical	325	8	7	2.2	7	2.2
Other engineering fields	0	0	0	0	0	0
Total positions	951	6	53	5.6	34	3.6

Table 9

Perceived Change Within the Past Five Years in the Ability to Recruit or Retain Permanent Full-time Engineering Faculty

Change	Percentage of Institutions Reporting Change						
	Total Institutions (N=244)	Public			Private		
		Total (N=151)	Universities (N=86)	Four-Year (N=65)	Total (N=93)	Universities (N=45)	Four-Year (N=48)
There has been a substantial increase in our ability to recruit or retain full-time engineering faculty.	3.7	5.3	2.4	9.1	0	0	0
There has been a slight or moderate increase in our ability to recruit full-time engineering faculty.	3.3	3.3	1.2	6.1	3.3	6.7	0
There has been no change in our ability to recruit or retain full-time engineering faculty.	4.9	.7	1.2	0	12.0	15.6	8.5
There has been a slight or moderate decrease in our ability to recruit or retain full-time engineering faculty.	37.3	27.2	28.2	25.8	55.4	57.8	53.2
There has been a substantial decrease in our ability to retain full-time engineering faculty.	50.8	63.5	67.0	59.0	29.3	20.0	38.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 10

Effects Upon Engineering Colleges of the Difficulty in Recruiting or Retaining Full-time Faculty

Effects	Percentage of Institutions Reporting Effect						
	All Institutions	Public			Private		
		Total	Universities	Four-Year	Total	Universities	Four-Year
Number of institutions that reported decreased ability to recruit or retain full-time engineering faculty	*215*	*137*	*81*	*56*	*78*	*35*	*43*
There has been a reduction in faculty research.	34.8	36.7	38.5	34.0	29.6	25.0	33.3
There has been an increase in teaching loads.	80.3	80.5	85.9	72.0	78.9	53.1	100.0
There is greater reliance on graduate teaching assistants or part-time faculty.	65.7	77.3	80.8	72.0	42.3	62.5	25.6
We have been unable to offer courses in certain subjects.	53.5	54.7	53.8	6.0	50.7	37.5	61.5
Other	21.2	18.0	16.7	20.0	23.9	9.4	35.9
There has been no significant effect as yet.	8.1	6.2	3.8	10.0	9.9	9.4	10.3

Table 11

Extent of Decrease in Quality of Research and Instruction in Engineering Colleges Resulting from Difficulty in Recruiting or Retaining Full-time Faculty

Extent of Decrease in Quality	Percentage of Institutions Rating Quality						
	All Institutions	Public			Private		
		Total	Universities	Four-Year	Total	Universities	Four-Year
Number of institutions that reported decreased ability to recruit or retain full-time engineering faculty	*215*	*137*	*81*	*56*	*78*	*35*	*43*
Research							
No decrease	24.5	24.1	29.3	15.7	26.3	45.5	0
Yes, to a slight degree	40.1	35.3	32.9	39.2	52.6	30.3	83.3
Yes, to a moderate degree	29.2	33.1	31.7	35.3	19.3	21.2	16.7
Yes, to a great degree	6.2	7.5	6.1	9.8	1.8	3.0	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Instruction							
No decrease	18.4	17.0	15.9	18.9	20.8	17.6	23.3
Yes, to a slight degree	40.6	33.3	34.1	32.1	55.8	61.8	51.2
Yes, to a moderate degree	31.1	36.3	40.2	30.1	20.8	14.7	25.5
Yes, to a great degree	9.9	13.3	9.8	18.9	2.6	5.9	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 12

Full-time Junior Engineering Faculty Who Did Not Receive Their Baccalaureates in the United States

Institutional Category	Total Junior Faculty	Percentage with Baccalaureate Outside the U.S.
Total	3,397	23.7
Top 50 institutions*	1,400	22.1
Public institutions	2,416	25.0
Private institutions	981	20.5
Public universities	1,768	22.3
Private universities	683	19.2
Public four-year colleges	648	32.4
Private four-year colleges	298	23.5

*In level of engineering R & D expenditures, FY79

Table 13

Full-time Engineering Faculty Who Voluntarily Left Academia for Full-time Employment in Industry, 1979-80

Engineering Fields	Total Institutions	Top 50*	Public			Private		
			Total	Universities	Four-Year	Total	Universities	Four-Year
Aeronautical and astronautical	3.0	2.1	1.4	1.8	0	7.7	11.6	0
Chemical	8.1	9.8	9.5	8.9	11.9	3.9	5.8	0
Civil	15.4	15.4	17.1	17.3	16.4	10.6	5.8	20.0
Computer science and computer engineering	10.8	9.7	11.9	11.9	11.9	7.7	11.6	0
Electrical	22.4	23.1	21.2	19.0	28.4	26.0	17.4	42.9
Industrial	6.0	6.3	5.1	6.2	1.5	8.6	2.9	20.0
Mechanical	19.7	15.4	17.1	19.0	10.5	26.9	31.9	17.1
Other engineering fields	14.6	18.2	16.7	15.9	19.4	8.6	13.0	0
Total faculty	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(N=397)	(N=143)	(N=293)	(N=226)	(N=67)	(N=104)	(N=69)	(N=35)

*In level of engineering and R & D expenditures, FY79

Table 14

Perceived Change over the Past Five Years in the Degree of Competition with Industry in the Recruitment and Retention of Full-time Engineering Faculty

Change in Degree of Competition	Percentage of Institutions Reporting Change						
	Total Institutions (N=244)	Public			Private		
		Total (N=151)	Universities (N=86)	Four-Year (N=65)	Total (N=93)	Universities (N=45)	Four-Year (N=48)
Competition has decreased.	0	0	0	0	0	0	0
Competition has not changed.	10.2	7.9	4.7	12.1	12.9	17.8	8.3
Competition has increased.	89.8	92.1	95.3	87.9	87.1	82.2	91.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 15

Chief Reason for Increased Competition with Industry in the Recruitment and Retention of Full-time Engineering Faculty

Chief Reason	Total Institutions	Public			Private		
		Total	Universities	Four-Year	Total	Universities	Four-Year
Number of institutions that reported increased competition with industry	*219*	*139*	*81*	*58*	*80*	*36*	*44*
Salaries and financial benefits in industry are perceived as superior.	76.2	73.2	77.5	67.2	82.5	77.8	86.4
Industry allows concentration upon research free from the demands of teaching.	.9	1.4	1.3	1.7	0	0	0
Industry is perceived to offer better opportunities for advancement and recognition.	4.6	3.6	3.7	3.5	5.0	11.1	0
Fewer new engineering doctorates have graduated in recent years than in the past.	15.1	17.4	13.8	22.4	11.3	8.3	13.6
Other	3.2	4.4	3.7	5.2	1.2	2.8	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX A: Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

HIGHER EDUCATION PANEL
(202) 833-4757

October 15, 1980

Dear Higher Education Panel Representative:

Enclosed is Higher Education Panel survey #52, "Recruitment and Retention of Full-Time Engineering Faculty, Fall 1980." Sponsored by the National Science Foundation, the survey seeks to determine the extent of competition for qualified engineering personnel and the impact of competition upon an institution's ability to maintain its level of research and instruction.

There is some anecdotal evidence that strong competition from industry is having an adverse effect on higher education's ability to recruit and retain engineering faculty, largely because of the employment advantages perceived to lie in industry. At present, there is insufficient information to enable the Foundation to determine whether or how this concern should be addressed. It is hoped that the findings from this survey will fill part of that need.

The questionnaire should be completed by the dean of the college of engineering (or other organizational unit designated as engineering).

Please understand that responses from your institution will be held in strictest confidence. As with other surveys, the data you provide will be reported in summary fashion only and will not be identifiable with your institution. This survey is authorized by the National Science Foundation Act of 1950, as amended. Although you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely.

Please return the completed questionnaire to us by November 10, 1980. A prepaid envelope has been enclosed for your convenience. If you have any problems or questions, please do not hesitate to telephone us collect at 202-833-4757.

Thank you for your continued assistance.

Sincerely,

Frank J. Atelsek

Frank J. Atelsek
Panel Director

OMB No. 099-R0265
Exp. 6/81

American Council on Education
Higher Education Panel Survey No. 52:
Recruitment and Retention of Full-Time Engineering Faculty, Fall 1980

1. Please supply the following position information for the college of engineering as of fall 1980. (SEE INSTRUCTIONS ON THE OPPOSITE PAGE.)

Engineering Fields	Permanent Full-Time Faculty Positions		
	Total number of positions (filled and unfilled)	Number in A which were unfilled at the beginning of the 1980 fall term	Number in B which have been unfilled since the beginning of the 1979 fall term
	A	B	C
Aeronautical and astronautical			
Chemical			
Civil			
Computer science and computer engineering			
Electrical			
Industrial			
Mechanical			
Other engineering fields			
Total positions			

Do not include engineering technology

2. Has there been any change within the past five years in the ability of your engineering college to recruit or retain permanent full-time faculty?

( ) a. There has been a substantial increase in our ability to recruit or retain full-time engineering faculty.

( ) b. There has been a slight or moderate increase in our ability to recruit or retain full-time engineering faculty.

( ) c. There has been no change in our ability to recruit or retain full-time engineering faculty.

( ) d. There has been a slight or moderate decrease in our ability to recruit or retain full-time engineering faculty.

( ) e. There has been a substantial decrease in our ability to recruit or retain full-time engineering faculty.

If you checked **"a", "b", or "c", please skip question 3 and 4 and go straight to question 5.**

3. How has the overall difficulty in recruiting or retaining full-time faculty affected your engineering college?

CHECK ALL THAT APPLY.

( ) There has been a reduction in faculty research.
( ) There has been an increase in teaching loads.
( ) There is greater reliance on graduate teaching assistants or part-time faculty.
( ) We have been unable to offer courses in certain subjects.
( ) Other (specify) _____.
( ) There has been no significant effect as yet.

4. Do you believe that the quality of research and instruction in your engineering college has decreased because of the difficulty in recruiting or retaining full-time faculty?

CHECK ONE IN EACH COLUMN

	Research	*Instruction*
No	( )	( )
Yes, to a slight degree	( )	( )
Yes, to a moderate degree	( )	( )
Yes, to a great degree	( )	( )

(over)

5. Of the full-time junior faculty (instructors and assistant professors) in permanent positions in your engineering college, how many *did not* receive their bachelor's degree in the United States?

_____ total number of junior engineering faculty

_____ number who received bachelor's degree outside the United States

6. Of the full-time faculty in permanent positions during the 1979-80 school year, how many voluntarily left your engineering college to work full-time *in industry* because of its perceived superior employment advantages?

Engineering Fields	Faculty Who Voluntarily Left for Industry
Aeronautical and astronautical	
Chemical	
Civil	
Computer science and computer engineering	
Electrical	
Industrial	
Mechanical	
Other engineering fields	
Total faculty	

Do not count those who were denied reappointment by your institution for any reason, including failure to receive tenure. Also *do not* include those who left because they anticipated failure to receive tenure.

7. Considering your college of engineering as a whole, how has the degree of competition *WITH INDUSTRY* changed over the past five years in the recruitment and retention of full-time faculty for permanent positions?

( ) a. Competition with industry decreased.
( ) b. Competition with industry has not changed.
( ) c. Competition with industry has increased.

***If you checked* "a" or "b" stop here. Thank you for your help.**

8. What do you think is the chief reason for the increased competition with industry?

CHECK ONLY ONE.

( ) Salaries and financial benefits in industry are perceived as superior to those in your engineering college.
( ) Employment security in industry is perceived as better than that in your engineering college.
( ) Industry allows concentration upon research free from the demands of teaching.
( ) Industry is perceived to offer better opportunities for advancement and recognition.
( ) Industry is perceived to provide better laboratory equipment and facilities.
( ) Fewer new engineering doctorates have graduated in recent years than in the past.
( ) Other (specify) _____

Thank you for your assistance.
Please return this form by **November 10, 1980** to:
Higher Education Panel
American Council on Education
One Dupont Circle, N.W.
Washington, D.C. 20036

Please keep a copy of this survey for your records.
Person completing form
Name _____
Dept. _____
Phone _____

If you have any questions or problems, please call the HEP staff collect at 202-833-4757.

Instructions

Please provide information on all full-time engineering faculty with appointments in the college of engineering (or other organizational unit designated as engineering) at your institution. Also include other engineering faculty outside the engineering college if they belong to departments specifically designated as being in a field of engineering.

Please exclude faculty in nonengineering departments (e.g., physics, mathematics) which may be part of the college of engineering. Also exclude engineering technology faculty.

Please allocate faculty and positions according to the most closely corresponding fields listed. Include under "other" those engineering positions which do not closely correspond to the listed fields.

Definitions

Full-time faculty - Include instructors, assistant professors, associate professors, full professors, and other equivalent ranks.

If a faculty appointment is split between two colleges, it should be included if 50 percent or more of the appointment is in the college of engineering.

Permanent positions - Include all tenure-track positions and other positions which have been designated for full-time faculty eligible for permanent employment. Do not include positions which are designated for faculty with a temporary appointment or who are otherwise ineligible for tenure.

If your college has a fixed budget, rather than a specific number of positions available, please report in question 1 the total number of full-time faculty who would be employed if qualified candidates were available for all positions.

Unfilled permanent positions - Please include in question 1 all permanent positions for which you have attempted to recruit full-time faculty but which remain unfilled by full-time faculty as of the time specified.

Also consider unfilled all those permanent positions for which you have attempted to recruit full-time faculty but which you were able to fill only with visiting or other temporary faculty.

Appendix B: Technical Notes

The survey instrument was mailed to all four-year colleges and universities in the Panel that had at least one engineering program accredited by the Engineers' Council for Professional Development in 1979. Usable responses were received from 88 percent of the 181 eligible Panel members.

Weighting

The usual HEP weighting process was not designed to deal with colleges of engineering. To adjust this process for the engineering faculty survey, a two-stage procedure was employed. The first stage used the standard HEP stratification whereas the second considered numbers of engineering degrees conferred.

I. HEP Stratification Design

	Cell	Population (N=244)	Respondents (N=159)
1	Public universities	86	75
2	Private universities	45	40
3	Public four-year FTE > 8,750	41	30
4	Private four-year FTE > 8,750	4	1
5	Public four-year FTE 3,700-8,750	10	5
6	Public four-year FTE < 3,700	15	2
7	Private four-year FTE 2,000-8,750	26	5
8	Private four-year FTE < 2,000	17	1

II. Revised Stratification Design

	Cell	Population (N=244)	Respondents (N=159)
1	Public universities > 300 (engineering degrees conferred in 1978)	46	38
2	Public universities < 300	40	37
3	Private universities > 300	16	13
4	Private universities < 300	29	27
5	Public four-year > 100	37	23
6	Public four-year < 100	29	14
7	Private four-year > 100	20	3
8	Private four-year < 100	27	4

This two-stage weighting was completed in the following steps:

Stage I: Using the HEP design (collapsed into 8 cells), an institutional weight was created by the ratio of the number of population institutions to the number of responding institutions, separately for each cell.

$$w_i = \frac{N_i \text{ population}}{n_i \text{ respondents}} \qquad \text{for each HEP stratification cell } i$$

Stage II. A second ratio was formed according to the respondent's position in the new stratification design partly based on degrees conferred in engineering. For each cell, the number of institutions in the population was divided by the sum of the weights the responding institutions acquired from their respective positions in the initial HEP design.

$$w_j = \frac{N_j \text{ population}}{\Sigma\, w_i n_i} \qquad \text{for each new stratification cell } j$$

Then the two ratios were multiplied together to form the final institutional weight.

$$W = w_i \times w_j$$

Because 74 percent of the survey population are Panel members, and 72 percent of of the population are in the certainty (self-representing) cells, no estimates of sampling error were computed.

Respondents

Among the 159 institutions that responded to the survey, private four-year colleges had a lower than average response rate (78 percent). The highest response rates were recorded for institutions in the South (97 percent), private universities

and institutions that awarded between 150 and 300 engineering degrees in 1978 (93 percent each).

Comparison of Respondents and Nonrespondents

Characteristic	Respondents (N=159)	Nonrespondents (N=22)	Response Rate
Total	100.0	100.0	88.3
Type and control			
Public universities	47.1	47.6	88.2
Private universities	25.2	14.3	93.0
Public four-year	23.3	28.6	85.4
Private four-year	4.4	9.5	77.8*
Census region			
East	21.4	23.8	87.2
Midwest	22.0	28.6	87.5
South	35.8	9.5	96.6
West	20.8	38.1	80.5
Degrees conferred in engineering (1978)			
Less than 150	28.9	38.1	85.2
150 - 300	34.0	19.0	93.1
301 - 450	16.4	23.8	83.9
More than 450	20.8	19.0	89.2

*Response rate falls more than ten percent below the average.

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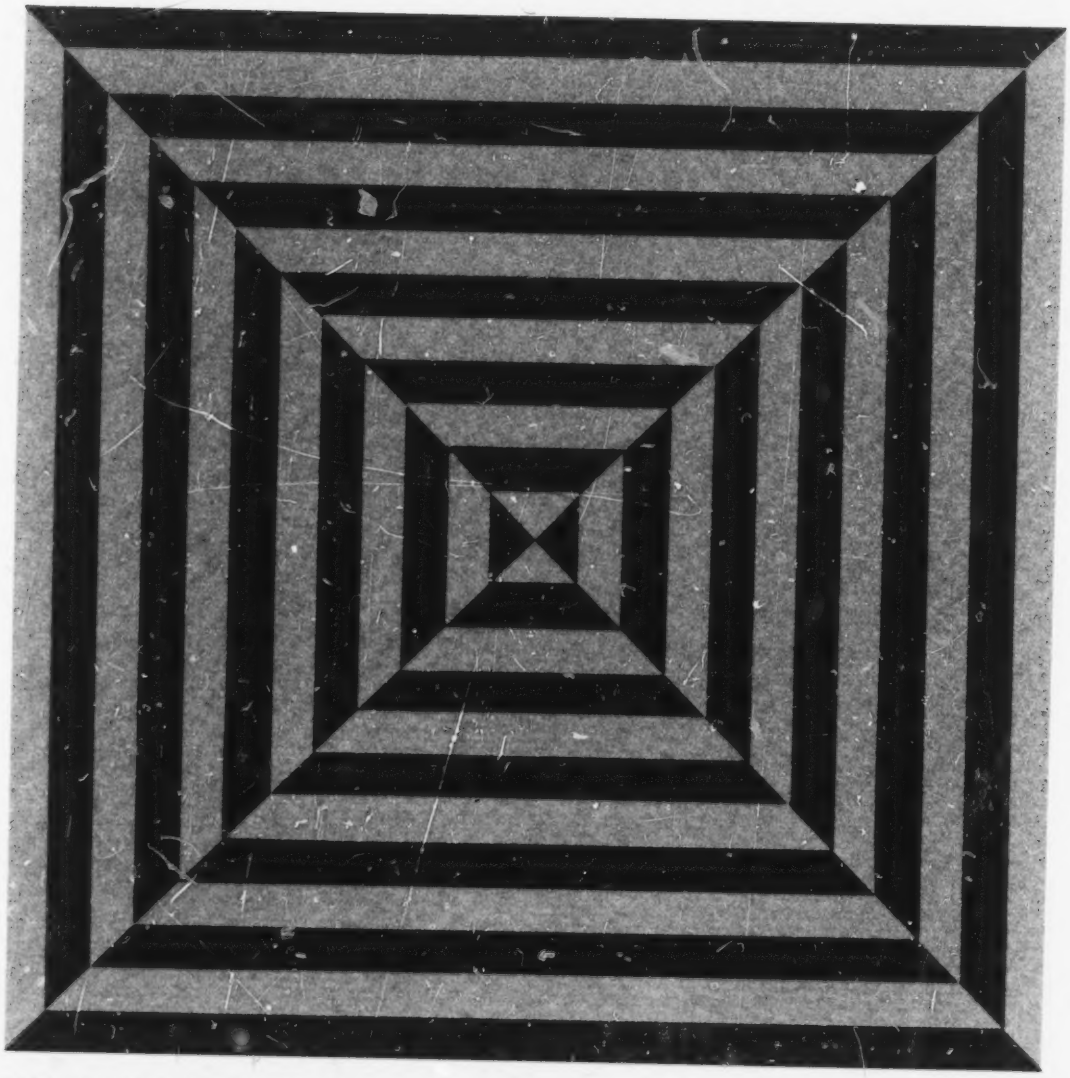
SABBATICAL AND RESEARCH LEAVES IN COLLEGES AND UNIVERSITIES

Charles J. Andersen and Frank J. Atelsek



HIGHER EDUCATION PANEL REPORT NUMBER 53
AMERICAN COUNCIL ON EDUCATION

FEBRUARY
1982

A Survey Funded by the National Science Foundation, the U. S. Department of Education, and the National Endowment for the Humanities

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AMERICAN COUNCIL ON EDUCATION

J. W. Peltason, *President*

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SABBATICAL AND RESEARCH LEAVES IN COLLEGES AND UNIVERSITIES

Charles J. Andersen

Frank J. Atelsek

Higher Education Panel Reports

Number 53 February 1982

American Council on Education
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As ever, we offer our special thanks to the HEP representatives at the participating campuses. They provided the data for this report and are the key elements in the successful operation of the HEP survey concept.

HIGHLIGHTS

HUMANITIES FACULTIES AND LEAVES

- In academic year 1979-80, 83,500 full-time faculty members taught in the humanities in the nation's institutions of higher education. Half were in four-year colleges, slightly more than one-quarter were in universities, and slightly fewer than one-quarter were in two-year colleges. These totals and distributions had not changed markedly since 1977-78.

- The sabbaticals awarded in 1979-80 numbered just over 5,300--approximately 3 percent fewer than those awarded two years earlier. However, the number awarded at two-year colleges had increased by one-quarter, whereas those at four-year colleges had dropped by 15 percent.

- Six to 6.6 percent of the full-time humanities faculty took sabbaticals during the three year period. This proportion varied according to type of institution, with a slightly higher rate (8.2 to 8.5 percent) at universities and a lower rate (4.2 to 5.6 percent) at two-year colleges.

- Leaves without pay were granted to about half as many humanities faculty members as were sabbaticals.

- Full-year awards accounted for slightly more than one-quarter (27 percent) of all the sabbaticals awarded to humanities faculty in 1979-80. Full-year awards accounted for more than half (55 percent) of the leaves without pay granted humanities faculty in the same year.

INSTITUTIONAL POLICIES GOVERNING LEAVES

- Three-quarters of the nation's colleges and universities offered sabbaticals as of winter 1981. Nearly all universities, 84 percent of the four-year colleges, and 60 percent of the two-year colleges did so.

- Nearly half of the institutions that offered sabbaticals awarded them competitively; another third awarded them semiautomatically.

- Full-time tenured faculty were eligible for sabbaticals at nearly all of the sabbatical-granting institutions. Administrative staff were eligible at about two-fifths of the institutions, and full-time nontenured faculty could receive them at 38 percent of the institutions.

- More than half of the institutions that awarded sabbatical leaves provided support on the basis of "half salary for a full year" or "full salary for a half year."

- Leaves without pay were available to faculty and staff at nearly all institutions. The most frequently cited permissible purpose for such leaves was "faculty development." "Research" was also accepted by a large percentage (78 percent) of the institutions that granted such leaves.

- One-quarter of the nation's institutions reported that they planned to review or amend their policies regarding sabbaticals in the next three years. Of these, one-third specified that they would be developing a leave policy.

Overview

This study was undertaken at the request of the National Endowment for the Humanities (NEH) to estimate the size of the full-time humanities faculty in the nation's colleges and universities, and to determine the proportion of that faculty who benefit from institutional policies governing sabbaticals and leaves without pay. In addition, the Endowment wanted to learn how widespread the practice of granting sabbaticals is and what some of the policies that relate to their use are.

NEH plays a substantial role in the support of research and advanced study in the humanities. It is therefore vitally interested in the availability and use of mechanisms such as the sabbatical that may be used to further research, enhance teaching capabilities, and encourage faculty development opportunities. Hence, a major concern of NEH has been the ability of humanities faculty to take leaves for professional or educational purposes.

In light of shifting levels of institutional resources and changes in the patterns of externally provided support, the Endowment has sought to examine both the frequency and kind of leaves taken by humanities faculty as well as the general institutional policies governing sabbaticals and leaves without pay. Data on the availability and use of those special types of research opportunity will assist the Endowment in determining the best use of public resources for furthering study and development in the humanities.

Methods Summary

The Higher Education Panel is a continuing survey research program created in 1971 by the American Council on Education to conduct specialized surveys on

topics of current policy interest to the higher education community and to government agencies.

The Panel is a stratified sample of 760 colleges and universities drawn from the population of more than 3,000 institutions listed in the National Center for Education Statistics' (NCES) Education Directory, Colleges and Universities. All institutions in the population are grouped according to the Panel's stratification design, which is based on three factors: institution type (university, four-year college, or two-year college), control or governance (public or private), and size (full-time-equivalent enrollment). For any given survey, either the entire Panel or an appropriate subgroup is used.

The questionnaire (see Appendix A) for this survey was mailed on February 2, 1981, to all Panel institutions except independent medical schools, religious or Bible colleges, and certain other specialized institutions, such as engineering and business colleges. Panel members were asked to indicate the size of their humanities faculty and their utilization of sabbaticals and leaves without pay. Institutions that formally provided for sabbaticals were asked a series of questions concerning who were eligible for leaves, how they were granted, what level of support was available, and institutional plans to review sabbatical policies.

From the 673 Panel members surveyed, 546 usable responses were obtained after mail and telephone follow-ups. This resulted in a response rate of slightly over 81 percent.

Data from responding institutions were statistically adjusted to represent the eligible national population of 2,481 universities, four-year colleges and two-year colleges with full-time humanities faculty. "Appendix B: Technical Notes" contains a description of the weighting procedure and a discussion of the reliability of the survey estimates.

Findings

There were an estimated 83,500 full-time humanities[1] faculty members in the nation's institutions of postsecondary education during academic year 1979-80. This represented an increase of only one-half of 1 percent over 1977-78. This change took place during a period when the size of the nation's full-time faculty (instructor and above) was estimated to have increased by just less than 1 percent, and its full-time-equivalent enrollment to have increased by 1.5 percent.[2]

Over half of the humanities faculty had their appointments at four-year colleges. One-fourth were at universities, and the remaining 21 percent were at two-year colleges (see table A). Public institutions employed roughly two-thirds of the total humanities faculty, and private institutions accounted for the rest.

Table A

Humanities Faculty, by Type of Institution, 1979-80

	Number
All institutions	83,500
Universities	22,600
Four-year colleges	43,200
Two-year colleges	17,800

Note: On this and subsequent tables, detail may not sum to totals because of weighting and rounding.

1. For this survey, the humanities were defined to include languages, both modern and classical; linguistics; literature; history; American studies; philosophy; archaeology; religious studies; and the history, criticism and theory of the arts.

2. NCES, Projections of Education Statistics to 1988-89 (Washington: GPO, 1980), pp. 43, 100.

Humanities Faculties And Leaves

Approximately one out of fifteen (6.6 percent) full-time humanities faculty took sabbaticals[3] in 1977-78, (table B). At universities the number increased slightly in each year examined in the survey, whereas at four-year and two-year colleges, there was a drop in the second year and a gain in the third. Notably, in the four-year sector the gain in 1979-80 was not as great as the earlier loss, so there were fewer sabbaticals at the end of the period than at the beginning.

Table B

Humanities Faculty Awarded Sabbatical Leaves, By Type of Institution

Academic Year	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	Number of sabbaticals awarded			
1977-78	5,504	1,855	2,852	797
1978-79	5,005	1,909	2,351	745
1979-80	5,335	1,915	2,423	998
	As a percentage of humanities faculty			
1977-78	6.6	8.3	6.7	4.5
1978-79	6.0	8.5	5.5	4.2
1979-80	6.4	8.5	5.6	5.6

In contrast, the number of leaves without pay increased over the period for each type of institution (table C). Apparently the reduction in sabbatical

3. A sabbatical is a leave of absence to which faculty may become entitled after a fixed period of service and which is wholly or partly supported by the institution.

leaves was being offset somewhat by granting more leaves without pay. However, the number of leaves without pay continued to be only about half of the number of sabbaticals.

Table C

Humanities Faculty Who Took Leaves Without Pay, by Type of Institution

Academic Year	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	Number of leaves without pay taken			
1977-78	2,457	901	1,215	341
1978-79	2,576	927	1,284	366
1979-80	2,847	938	1,492	417
	As a percentage of humanities faculty			
1977-78	3.0	4.0	2.8	1.9
1978-79	3.1	4.1	3.0	2.1
1979-80	3.4	4.1	3.5	2.3

These changes--fewer sabbaticals, more leaves without pay--are summarized in table D which shows the percentage change over the period by type of institution.

Table D

Percentage Change from 1977-78 to 1979-80 in Leaves Granted Humanities Faculty, by Type of Institution

	Sabbaticals	Leaves Without Pay
All institutions	-3.1	15.9
Universities	3.2	4.1
Four-year colleges	-15.0	22.8
Two-year colleges	25.2	22.3

The drop in the number of sabbaticals between 1977 and 1979 shown in table B represents 3.1 percent of the 1977 awards (see table D). The latter table also points up the sharp reduction of sabbaticals in the four-year college sector, the traditional bastion of the humanities and liberal arts. The drop contrasts with the increase by one-quarter in the number of sabbaticals awarded at two-year institutions.

For leaves without pay, each of the institutional sectors showed an increase during the period; in both the four-year and two-year college sectors the increase was slightly more than one-fifth.

Length Of Leaves

Data from the study permitted further analysis of leave-takers by the length of their leaves--whether they were for a full year or only part of one. In practice, sabbaticals were not often given for the full year. Over the three-year period, one-quarter to one-third of the reported sabbaticals were for a full year (see table E).

Most leaves without pay taken by humanities faculty during the reporting period were for the full year. This held true in each type of institution and in both the public and private sectors in 1977-78. However, by 1979-80 slightly less than half of these leaves were for a full year at the universities; and in the four-year colleges the proportion of such leaves had dropped slightly, although it still remained above the 50 percent mark. On the other hand, at two-year colleges, the percentage of the full-year leaves without pay had increased from 63 percent to 72 percent. Table E summarizes these changes by type of institution.

Table E

Full-Year Leaves as a Percentage of All Leaves, by Type of Leave and Institution

Academic Year	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
		Sabbaticals		
1977-78	27	28	25	33
1978-79	27	26	27	32
1979-80	27	29	26	27
		Leaves Without Pay		
1977-78	56	51	57	63
1978-79	55	46	60	58
1979-80	55	47	56	72

At two-year colleges, the decrease to approximately one-quarter in the proportion of year-long sabbaticals was accompanied by an increase in the percentage of year-long leaves without pay to nearly three-quarters. These two observations may invite speculation that these institutions tended to award the longer leave as one without pay. This survey, however, did not attempt to determine the reasons for such changes. Furthermore, it is not a trend that appears to be consistent among all institutional sectors. For example, data from the universities show a greater percentage increase in the long-term sabbatical than in the longer leave without pay (see detail table 5).

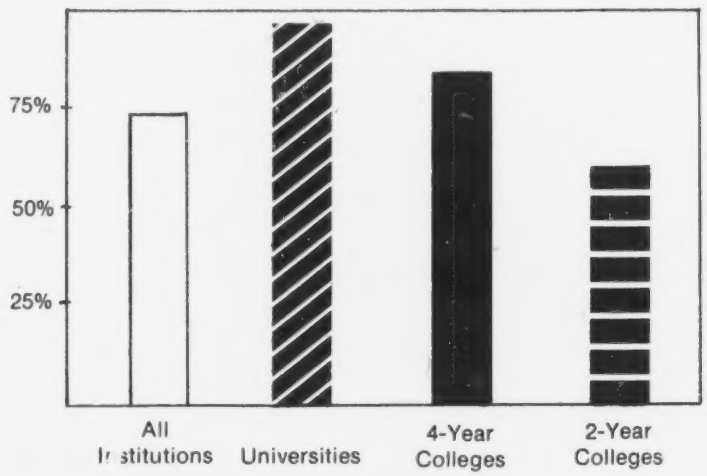
Sabbatical Policies

In order to place in better perspective the data concerning humanities faculty and their use of sabbaticals and leaves without pay, the Panel survey included several items concerning institutional leave policies.

As of winter 1981, three-quarters of the nation's 2,500 institutions of higher education covered in this survey made sabbatical leaves available to at least some members of their staff and faculty. This proportion varied considerably by type and control of institution.

Figure 1 shows that nearly all (96 percent) of the universities offered sabbaticals, as did 84 percent of the nation's four-year colleges. On the other hand, only three-fifths of the two-year colleges offered the benefit.

Fig. 1 Percentage of Institutions Offering Sabbaticals



The overwhelming majority of institutions that offered sabbaticals considered them to be a benefit for which all eligible staff had an equal opportunity in accordance with institutional policy and practice (table G). Only 5 percent of all institutions indicated that sabbaticals were negotiated separately as a part of an individual's contract. Four-year colleges appeared to show the least evidence of this practice; only 3 percent reported a procedure involving individual negotiation.

Table G

Provision for Sabbatical Leaves, by Type of Institution
(percentage distribution)

Provision for Sabbaticals	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
Total	100	100	100	100
Sabbaticals are a benefit for which all eligible staff have an equal opportunity	92	89	97	85
Sabbaticals are negotiated separately as part of each individual's contract	5	4	3	8
Other	4	7	1	7

Method Of Award and Eligibility For Sabbaticals

The manner in which sabbaticals were awarded varied considerably. The survey instrument identified four ways: automatically, semiautomatically, competitively, and "other".[4] A summary of the results appears in table H. It shows that nearly half of the sabbaticals were awarded competitively and about one-third semiautomatically. Fewer than 10 percent were given automatically.

Responses to a question that asked which faculty and staff were eligible for sabbaticals indicated that nearly all institutions so considered full-time tenured faculty. Those few who did not were probably institutions without tenure systems.

4. Institutions that indicated "semiautomatically" and "other" were asked to explain how the leaves were given. These explanations were analyzed with the result that some responses were reclassified. A sabbatical was considered "competitive" when the relative merits of an applicant's leave plan were weighed against others in allocating limited sabbatical funds.

Table H

Method of Awarding Sabbatical Leaves, by Type of Institution
(percentage distribution)

Method of Award	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
Total	100	100	100	100
Automatically	8	10	8	7
Semiautomatically	36	45	36	35
Competitively	47	34	49	47
Other	9	11	7	12

In addition, full-time nontenured faculty and the staff classified as "administrative and other" were eligible for sabbatical leaves at 38 percent and 42 percent of the institutions, respectively. Only a small proportion considered part-time faculty eligible.

Figure 2 summarizes sabbatical leave eligibility by type of faculty and type of institution.

Institutional Support For Faculty Members On Sabbatical

Responding institutions were asked what proportion of a faculty member's salary typically was provided for how long during a sabbatical leave. The modal arrangement was half salary for a full year. The reciprocal of that, full salary for a half year, was the next most frequently cited provision. These two combinations of percentages of salary and duration were the only ones reported by more than 20 percent of the institutions. The most generous arrangement, full salary for a full year, was identified as the typical arrangement at fewer than 3 percent of the institutions.

Fig. 2 Percentage of Institutions Reporting Faculty Eligibility for Sabbaticals, by Faculty Classification

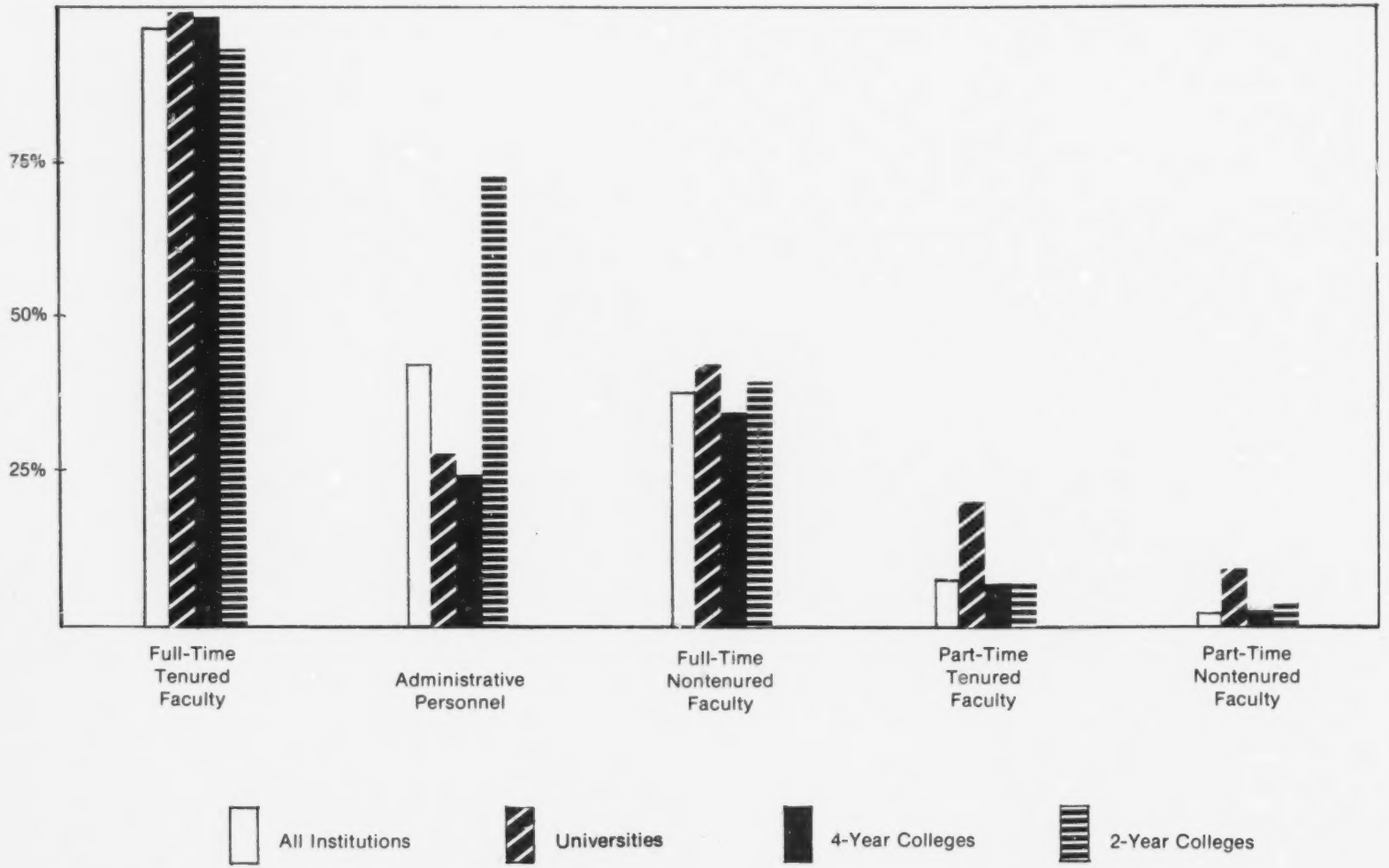


Table I shows the distribution of the three combinations mentioned, by type of institution. The major variance from the national average was by the two-year colleges. Although universities and four-year colleges both showed well above half of their number typically offering full salary for a half year, only about two-fifths of the two-year institutions did so.

Table I

Support Provided Faculty on Sabbatical Leaves, by Type of Institution
(in percentages)

Salary/Duration	All Institutions (N=1,846)	Universities (N=175)	Four-Year Colleges (N=1,006)	Two-Year Colleges (N=664)
Half salary/ full year	59	58	61	58
Full salary/ half year	57	54	67	42
Full salary/ full year	2	4	3	1

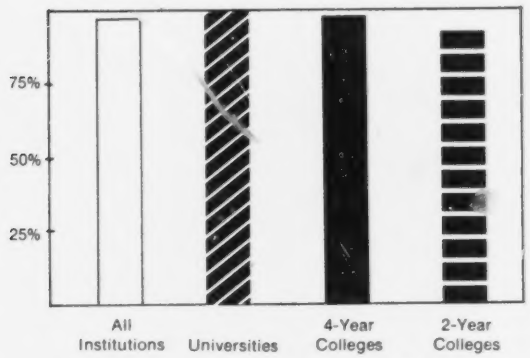
Note: Percentages are not additive. Many institutions indicated that a sabbatical may be for half salary for a full year or full salary for half a year.

Leave Without Pay

Nearly all institutions (97 percent) made leaves without pay available to their faculty and/or staff. Figure 3 shows that over 90 percent of each of the major institutional types granted such benefits.

In response to a query concerning the purposes for which leaves without pay were granted, nearly all (96 percent) of the institutions cited "faculty development". "Research" and "other academic employment" (a category that included

Fig. 3 Percentage of Institutions Offering Leaves Without Pay



visiting professorships) were identified by 78 percent and 72 percent, respectively, as being permissible purposes.

Table J shows these percentages by type of institution. While nearly all universities and most colleges allowed leaves without pay for research and other academic employment, only three-fifths of the universities and fewer than half of the four-year and two-year colleges allowed leaves for nonacademic employment.

Table J

Allowable Purposes for Leaves Without Pay, by Type of Institution (in percentages)

Allowable Purpose	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
Faculty development	96	96	96	96
Research	78	99	91	59
Other academic employment	72	96	85	52
Nonacademic employment	41	60	45	33

Plans To Review Sabbatical Leave Policies

Increasing personnel compensation costs at colleges and universities have sparked interest in policy changes which would limit sabbaticals as a staff benefit. Therefore, the HEP questionnaire asked institutions if they were planning within the next three years to review or amend their sabbatical leave policies. Those institutions that reported affirmatively were asked about the nature of the planned changes.

Table K

Sabbatical Leave Policy Changes, by Type of Institution
(in percentages)

Policy Change	All Institutions (N=572)	Universities (N=40)	Four-Year Colleges (N=258)	Two-Year Colleges (N=275)
Will develop policy	33	5	32	38
Will liberalize:				
eligibility requirements	4	12	6	1
terms of sabbatical	15	15	19	12
Will restrict:				
eligibility requirements	6	12	4	6
terms of sabbatical	9	12	5	12
Will terminate sabbaticals	*	3	0	0
Other	40	62	42	35

Note: Multiple responses were permitted.

*Less than .5 percent.

Responses indicated that only about one-quarter of the institutions were planning any change. Of those planning a review of some sort, about one-third would be developing a policy. Most of these were two-year colleges. Table K shows estimates of the percentages of institutions, categorized by type, that reported liberalization or restriction of the terms of and eligibility requirements for sabbaticals.

In the university and four-year college sectors, the institutions reporting liberalization equaled or outnumbered those reporting restrictions. In the two-year sector, however, that pattern was reversed. Only one institution (a university) reported plans to terminate its sabbatical leave program.

Forty percent of the institutions that planned to review or change their sabbatical policies indicated that the change would involve something other than the six options offered on the questionnaire. In over half of these cases the review was expected because of scheduled contract negotiations and the fact that provision for sabbaticals was a part of the institution's collective bargaining agreement. This was most frequently observed among public institutions. In about one-quarter of the "other" reasons the review of sabbatical was identified, policies were to be reexamined merely as part of a general faculty compensation review. In a few instances the "other" reasons included considering the sabbatical according to "cut-off age", ways to refine selection criteria and steps to decentralize the review and approval process.

Conclusions

An estimated 83,500 full-time humanities faculty members taught at the nation's institutions of higher education in academic year 1979-80. This figure has not changed substantially since 1977-78.

Approximately 6.5 percent of humanities faculty were awarded sabbaticals in 1979-80, and another 3.4 percent were granted leaves without pay. Thus, it appears likely that, in the humanities, nearly 10 percent of the full-time faculty received some type of leave for research or professional development in 1979-80. A majority of the institutions that awarded sabbaticals provide support for the grantees on the basis of half pay for a full year or full pay for a half year.

The sabbatical leave is apparently a well-established part of this country's system of higher education. It is available at nearly all universities, well over four-fifths of the nation's four-year colleges, and at three-fifths of its two-year colleges.

While one-quarter of the country's institutions plan to review their policies concerning sabbaticals in the next three years, apparently very few of these are considering restricting either the terms or the eligibility requirements for sabbaticals.

At nearly all of the institutions that granted sabbaticals, full-time tenured faculty were eligible. In contrast, fewer than one-half of the institutions report that administrative staff could be granted the award. Fewer than two-fifths of the institutions reported eligibility for other categories of faculty.

Detailed Report Tables

Table 1

Number and Percentage Distribution of Full-Time Humanities Faculty, by Type and Control of Institution, AY 1977-78 through 1979-80

Type and Control of Institution	1977-78		1978-79		1979-80	
	Number	Percent	Number	Percent	Number	Percent
All institutions	83,053	100.0	83,286	100.0	83,537	100.0
Universities	22,483	27.1	22,579	27.1	22,628	27.1
Four-year colleges	42,872	51.6	42,942	51.6	43,154	51.7
Two-year colleges	17,697	21.3	17,765	21.3	17,755	21.3
Public institutions	53,024	63.8	53,090	63.7	53,049	63.5
Universities	15,077	18.2	15,137	18.2	15,126	18.1
Four-year colleges	21,894	26.4	21,868	26.3	21,951	26.3
Two-year colleges	16,053	19.3	16,086	19.3	15,972	19.1
Private institutions	30,029	36.2	30,196	36.3	30,488	36.5
Universities	7,406	8.9	7,442	8.9	7,502	9.0
Four-year colleges	20,978	25.3	21,074	25.3	21,203	25.4
Two-year colleges	1,644	2.0	1,679	2.0	1,783	2.1

Note: On this and subsequent tables, detail may not add to totals because of rounding.

Table 2

Full-Time Humanities Faculty Who Took Leave,
by Type and Length of Leave, AY 1977-78 through 1979-80:

All Institutions

Type and Length of Leave	1977-78 Number Who Took Leave	1977-78 As a % of All Humanities Faculty	1978-79 Number Who Took Leave	1978-79 As a % of All Humanities Faculty	1979-80 Number Who Took Leave	1979-80 As a % of All Humanities Faculty
	ALL INSTITUTIONS					
All sabbatical leaves	5,504	6.6	5,005	6.0	5,335	6.4
Partial year	4,000	4.8	3,631	4.4	3,884	4.6
Full year	1,504	1.8	1,374	1.6	1,451	1.7
All leaves without pay	2,457	3.0	2,576	3.1	2,847	3.4
Partial year	1,089	1.3	1,169	1.4	1,268	1.5
Full year	1,368	1.6	1,407	1.7	1,579	1.9
	UNIVERSITIES					
All sabbatical leaves	1,855	8.3	1,909	8.5	1,915	8.5
Partial year	1,327	5.9	1,404	6.2	1,358	6.0
Full year	528	2.3	505	2.2	557	2.5
All leaves without pay	901	4.0	927	4.1	938	4.1
Partial year	443	2.0	496	2.2	494	2.2
Full year	458	2.0	431	1.9	444	2.0
	FOUR-YEAR COLLEGES					
All sabbatical leaves	2,852	6.7	2,351	5.5	2,423	5.6
Partial year	2,136	5.0	1,720	4.0	1,797	4.2
Full Year	716	1.7	631	1.5	626	1.5
All leaves without pay	1,215	2.8	1,284	3.0	1,492	3.5
Partial year	520	1.2	520	1.2	658	1.5
Full year	695	1.6	764	1.8	834	1.9
	TWO-YEAR COLLEGES					
All sabbatical leaves	797	4.5	745	4.2	998	5.6
Partial year	537	3.0	508	2.9	729	4.1
Full year	260	1.5	237	1.3	269	1.5
All leaves without pay	341	1.9	366	2.1	417	2.3
Partial year	127	0.7	154	0.9	116	0.7
Full year	214	1.2	212	1.2	301	1.7

Table 3

Full-Time Humanities Faculty Who Took Leave, by Type and Length of Leave, AY 1977-78 through 1979-80:

Public Institutions

Type and Length of Leave	1977-78 Number Who Took Leave	1977-78 As a % of All Humanities Faculty	1978-79 Number Who Took Leave	1978-79 As a % of All Humanities Faculty	1979-80 Number Who Took Leave	1979-80 As a % of All Humanities Faculty
ALL PUBLIC INSTITUTIONS						
All sabbatical leaves	3,024	5.7	3,028	5.7	3,155	5.9
Partial year	2,209	4.2	2,231	4.2	2,301	4.3
Full year	815	1.5	797	1.5	854	1.6
All leaves without pay	1,435	2.7	1,566	2.9	1,614	3.0
Partial year	627	1.2	699	1.3	643	1.2
Full year	808	1.5	867	1.6	971	1.8
PUBLIC UNIVERSITIES						
All sabbatical leaves	1,118	7.4	1,174	7.8	1,156	7.6
Partial year	848	5.6	914	6.0	858	5.7
Full year	270	1.8	260	1.7	298	2.0
All leaves without pay	566	3.8	609	4.0	592	3.9
Partial year	280	1.9	332	2.2	306	2.0
Full year	286	1.9	277	1.8	286	1.9
PUBLIC FOUR-YEAR COLLEGES						
All sabbatical leaves	1,161	5.3	1,125	5.1	1,089	5.0
Partial year	824	3.8	809	3.7	749	3.4
Full year	337	1.5	316	1.4	340	1.5
All leaves without pay	564	2.6	625	2.9	640	2.9
Partial year	221	1.0	230	1.1	221	1.0
Full year	343	1.6	395	1.8	419	1.9
PUBLIC TWO-YEAR COLLEGES						
All sabbatical leaves	745	4.6	728	4.5	911	5.7
Partial year	537	3.3	508	3.2	694	4.3
Full year	208	1.3	220	1.4	217	1.4
All leaves without pay	307	1.9	331	2.1	383	2.4
Partial year	127	0.8	136	0.8	116	0.7
Full year	180	1.1	195	1.2	267	1.7

Table 4

Full-Time Humanities Faculty Who Took Leave, by Type and Length of Leave, AY 1977-78 through 1979-80:

Private Institutions

Type and Length of Leave	1977-78 Number Who Took Leave	1977-78 As a % of All Humanities Faculty	1978-79 Number Who Took Leave	1978-79 As a % of All Humanities Faculty	1979-80 Number Who Took Leave	1979-80 As a % of All Humanities Faculty
ALL PRIVATE INSTITUTIONS						
All sabbatical leaves	2,480	8.3	1,977	6.5	2,180	7.2
Partial year	1,790	6.0	1,400	4.6	1,583	5.2
Full year	690	2.3	577	1.9	597	2.0
All leaves without pay	1,022	3.4	1,011	3.3	1,234	4.0
Partial year	462	1.5	471	1.6	626	2.1
Full year	560	1.9	540	1.8	608	2.0
PRIVATE UNIVERSITIES						
All sabbatical leaves	737	10.0	735	9.9	759	10.1
Partial year	479	6.5	490	6.6	500	6.7
Full year	258	3.5	245	3.3	259	3.5
All leaves without pay	336	4.5	317	4.3	346	4.6
Partial year	163	2.2	163	2.2	188	2.5
Full year	173	2.3	154	2.1	158	2.1
PRIVATE FOUR-YEAR COLLEGES						
All sabbatical leaves	1,692	8.1	1,226	5.8	1,334	6.3
Partial year	1,312	6.3	911	4.3	1,048	4.9
Full year	380	1.8	315	1.5	286	1.3
All leaves without pay	651	3.1	659	3.1	852	4.0
Partial year	299	1.4	290	1.4	437	2.1
Full year	352	1.7	369	1.8	415	2.0
PRIVATE TWO-YEAR COLLEGES						
All sabbatical leaves	52	3.2	17	1.0	87	4.9
Partial year	0	0.0	0	0.0	35	2.0
Full year	52	3.2	17	1.0	52	2.9
All leaves without pay	35	2.1	34	2.0	35	2.0
Partial year	0	0.0	17	1.0	0	0.0
Full year	35	2.1	17	1.0	35	2.0

Table 5

Percentage Change in Full-Time Humanities Faculty Who Took Leave, by Type and Length of Leave, Between AY 1977-78 and 1979-80

Type and Length of Leave	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
		ALL INSTITUTIONS		
All sabbatical leaves	-3.1	3.2	-15.0	25.2
Partial year	-2.9	2.3	-15.9	35.8
Full Year	-3.5	5.5	-12.6	3.5
All leaves without pay	15.9	4.1	22.8	22.3
Partial year	16.4	11.5	26.5	-8.7
Full year	15.4	-3.1	20.0	40.7
		PUBLIC INSTITUTIONS		
All sabbatical leaves	4.3	3.4	-6.2	22.3
Partial year	4.2	1.2	-9.1	29.2
Full year	4.8	10.4	.9	4.3
All leaves without pay	12.5	4.6	13.5	24.8
Partial year	2.6	9.3	0	-8.7
Full year	20.2	0	22.2	48.3
		PRIVATE INSTITUTIONS		
All sabbatical leaves	-12.1	3.0	-21.2	67.3
Partial year	-11.6	4.4	-20.1	NA
Full year	-13.5	.4	-24.7	0
All leaves without pay	20.7	3.0	30.9	0
Partial year	35.5	15.3	46.2	0
Full year	8.6	-8.7	17.9	0

Table 6

Institutions That Award Leaves, Winter 1981

Leave Policy	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
		ALL INSTITUTIONS		
All institutions	N=2,481	N=182	N=1,201	N=1,098
Percentage that award:				
Sabbatical leaves	74.4	96.1	83.8	60.5
Leaves without pay	96.6	100.0	99.4	93.0
		PUBLIC INSTITUTIONS		
Public institutions	N=1,334	N=112	N=350	N=873
Percentage that award:				
Sabbatical leaves	73.2	94.6	83.8	66.2
Leaves without pay	98.2	100.0	100.0	97.1
		PRIVATE INSTITUTIONS		
Private institutions	N=1,147	N=71	N=851	N=225
Percentage that award:				
Sabbatical leaves	75.8	98.3	83.8	38.5
Leaves without pay	94.9	100.0	99.2	76.9

Table 7

Percentage Distribution of Institutions That Award Sabbatical Leaves, by Type of Sabbatical Leave Policy, Winter 1981

Type of Policy	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	ALL INSTITUTIONS			
All policies	100.0 (N=1,846)	100.0 (N=175)	100.0 (N=1,006)	100.0 (N=664)
Sabbatical leaves are a benefit for which all staff have equal opportunity	91.8	89.0	96.9	84.8
Sabbatical leaves are negotiated separately as a part of each contract	4.7	4.1	2.6	8.0
Other policy	3.6	6.8	0.6	7.2
	PUBLIC INSTITUTIONS			
All policies	100.0 (N=977)	100.0 (N=105)	100.0 (N=293)	100.0 (N=578)
Sabbatical leaves are a benefit for which all staff have equal opportunity	89.2	90.9	95.9	85.5
Sabbatical leaves are negotiated separately as a part of each contract	4.9	4.5	2.6	6.2
Other policy	5.9	4.5	1.5	8.3
	PRIVATE INSTITUTIONS			
All policies	100.0 (N=869)	100.0 (N=70)	100.0 (N=713)	100.0 (N=87)
Sabbatical leaves are a benefit for which all staff have equal opportunity	94.7	86.2	97.3	80.0
Sabbatical leaves are negotiated separately as a part of each contract	4.3	3.4	2.5	20.0
Other policy	1.0	10.3	0.2	0.0

Table 8

Percentage Distribution of Institutions That Award Sabbatical Leaves, by Method of Award, Winter 1981

Method of Award	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	ALL INSTITUTIONS			
All methods	100.0 (N=1,846)	100.0 (N=175)	100.0 (N=1,006)	100.0 (N=664)
Automatically	7.9	10.3	8.3	6.6
Semiautomatically	36.3	44.5	35.8	34.8
Competitively	46.9	34.2	49.2	46.7
Other methods	9.0	11.0	6.7	11.9
	PUBLIC INSTITUTIONS			
All methods	100.0 (N=977)	100.0 (N=106)	100.0 (N=293)	100.0 (N=578)
Automatically	6.1	8.0	8.5	4.6
Semiautomatically	31.7	38.6	19.0	37.0
Competitively	52.1	46.6	62.9	47.7
Other methods	10.0	6.8	9.6	10.7
	PRIVATE INSTITUTIONS			
All methods	100.0 (N=869)	100.0 (N=70)	100.0 (N=713)	100.0 (N=87)
Automatically	9.8	13.8	8.2	20.0
Semiautomatically	41.4	53.4	42.8	20.0
Competitively	41.0	15.5	43.6	40.0
Other methods	7.8	17.2	5.4	20.0

Table 9

Percentage of Institutions That Award Sabbatical Leaves, by Category of Eligible Faculty and Staff, Winter 1981

Faculty & Staff Eligibility Categories	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	ALL INSTITUTIONS			
All eligibility categories	100.0 (N=1,846)	100.0 (N=175)	100.0 (N=1,006)	100.0 (N=664)
Full-time tenured faculty	96.0	99.4	97.6	93.1
Part-time tenured faculty	7.4	19.4	6.5	5.6
Full-time nontenured faculty	38.2	43.4	35.4	41.1
Part-time nontenured faculty	2.5	8.0	1.5	2.6
Administrative and other staff	42.0	27.4	24.5	72.6
	PUBLIC INSTITUTIONS			
All eligibility categories	100.0 (N=977)	100.0 (N=106)	100.0 (N=293)	100.0 (N=578)
Full-time tenured faculty	96.8	98.1	100.0	94.8
Part-time tenured faculty	6.3	22.6	6.5	3.3
Full-time nontenured faculty	35.5	41.5	33.4	35.3
Part-time nontenured faculty	1.0	9.4	0.0	0.0
Administrative and other staff	59.2	38.7	42.3	71.5
	PRIVATE INSTITUTIONS			
All eligibility categories	100.0 (N=869)	100.0 (N=70)	100.0 (N=713)	100.0 (N=87)
Full-time tenured faculty	95.2	100.0	96.5	79.3
Part-time tenured faculty	8.4	14.3	6.5	19.5
Full-time nontenured faculty	41.2	44.3	36.2	79.3
Part-time nontenured faculty	4.3	7.1	2.1	19.5
Administrative and other staff	22.9	10.0	17.1	79.3

Note: Percentages are not additive; multiple responses were permitted.

Table 10

Percentage of Institutions That Award Sabbatical Leaves, by Type of Planned Policy Review, Winter 1981

Type of Policy Review or Change	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	ALL INSTITUTIONS			
All institutions	100.0 (N=2,481)	100.0 (N=182)	100.0 (N=1,201)	100.0 (N=1,098)
Percentage planning to review policies concerning sabbatical leaves	23.1 (N=572)	22.0 (N=40)	21.5 (N=258)	25.0 (N=275)
Percentage planning to:				
Develop sabbatical leave policy	33.0	5.0	31.8	38.2
Liberalize eligibility requirements	4.0	12.5	6.2	0.7
Liberalize terms of sabbatical leaves	15.2	15.0	18.6	12.0
Restrict eligibility requirements	5.6	12.5	3.5	6.5
Restrict terms of sabbatical leaves	8.9	12.5	5.4	11.6
Terminate sabbatical leaves	0.2	2.5	0.0	0.0
Other	40.2	62.5	41.9	35.3
	PUBLIC INSTITUTIONS			
Public institutions	100.0 (N=1,334)	100.0 (N=112)	100.0 (N=350)	100.0 (N=873)
Percentage planning to review policies concerning sabbatical leaves	22.3 (N=298)	25.0 (N=28)	23.7 (N=83)	21.5 (N=188)
Percentage planning to:				
Develop sabbatical leave policy	23.8	0.0	21.7	28.2
Liberalize eligibility requirements	1.7	7.1	0.0	1.1
Liberalize terms of sabbatical leaves	9.4	17.9	9.6	8.5
Restrict eligibility requirements	7.7	14.3	2.4	9.6
Restrict terms of sabbatical leaves	11.7	14.3	0.0	17.0
Terminate sabbatical leaves	0.0	0.0	0.0	0.0
Other	50.7	57.1	67.5	42.0
	PRIVATE INSTITUTIONS			
Private institutions	100.0 (N=1,147)	100.0 (N=71)	100.0 (N=851)	100.0 (N=225)
Percentage planning to review policies concerning sabbatical leaves	23.9 (N=274)	16.9 (N=12)	20.6 (N=175)	38.7 (N=87)
Percentage planning to:				
Develop sabbatical leave policy	43.1	16.7	36.6	59.8
Liberalize eligibility requirements	6.6	16.7	5.1	0.0
Liberalize terms of sabbatical leaves	21.5	8.3	23.4	19.5
Restrict eligibility requirements	2.9	8.3	4.0	0.0
Restrict terms of sabbatical leaves	5.5	8.3	8.0	0.0
Terminate sabbatical leaves	0.4	8.3	0.0	0.0
Other	28.5	83.3	29.1	19.5

Note: Percentages are not additive; multiple responses were permitted.

Table 11

Percentage of Institutions That Grant Leaves Without Pay, by Purpose for Which Leave Was Granted, Winter 1981

Purpose for Which Leaves Without Pay May Be Granted	All Institutions	Universities	Four-Year Colleges	Two-Year Colleges
	ALL INSTITUTIONS			
All institutions	100.0 (N=2,481)	100.0 (N=182)	100.0 (N=1,201)	100.0 (N=1,098)
Percentage that grant leaves without pay	96.6 (N=2,397)	100.0 (N=182)	99.4 (N=1,194)	93.0 (N=1,021)
Of those that grant leaves, percentage that grant leaves for:				
Research	78.0	98.9	91.2	58.8
Faculty development	96.1	95.6	95.9	96.5
Other academic employment	72.0	96.2	85.2	52.3
Nonacademic employment	41.2	59.9	45.0	33.5
Other purposes	11.3	6.6	12.5	10.8
	PUBLIC INSTITUTIONS			
Public institutions	100.0 (N=1,334)	100.0 (N=112)	100.0 (N=350)	100.0 (N=873)
Percentage that grant leaves without pay	98.2 (N=1,310)	100.0 (N=112)	100.0 (N=350)	97.1 (N=848)
Of those that grant leaves, percentage that grant leaves for:				
Research	68.3	98.2	92.3	54.4
Faculty development	97.6	98.2	96.9	97.8
Other academic employment	61.7	95.5	82.6	48.7
Nonacademic employment	38.9	66.1	46.3	32.2
Other purposes	10.5	8.9	10.3	11.0
	PRIVATE INSTITUTIONS			
Private institutions	100.0 (N=1,147)	100.0 (N=71)	100.0 (N=851)	100.0 (N=225)
Percentage that grant leaves without pay	94.9 (N=1,088)	100.0 (N=71)	99.2 (N=844)	76.9 (N=173)
Of those that grant leaves, percentage that grant leaves for:				
Research	89.6	98.6	90.9	79.8
Faculty development	94.2	90.1	95.4	90.2
Other academic employment	84.4	95.8	86.3	69.9
Nonacademic employment	43.9	49.3	44.3	39.9
Other purposes	12.2	2.8	13.4	9.8

Note: Percentages are not additive; multiple responses were permitted.

Appendix A: Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

HIGHER EDUCATION PANEL
(202) 833-4757

February 2, 1981

Dear Higher Education Panel Representative:

Attached is Higher Education Panel Survey #53, "Sabbatical and Research Leaves in Colleges and Universities." The purpose of the survey is to gather data on institutional policies affecting sabbatical leaves and leaves without pay and to chart trends in faculty members taking such leaves.

The National Endowment for the Humanities (NEH), the sponsor of this survey, recognizes its role in support of research, education, and public activity in the humanities. Its responsibilities entail a vital presence in the whole area of sponsorship of individual faculty research and personal development opportunities. The appropriate mix of research fellowships -- pedagogical or curricula-oriented fellowships, or the more conventional faculty development opportunities provided by NEH -- will be reviewed with a concern for the shifting resources provided by the nation's colleges, universities, and the private sector. The survey findings will assist NEH to determine needs and priorities in this area.

Our field test results indicated that the most likely respondent for this survey would be the Office of Academic Affairs or the Office of the Dean of Instruction. As usual, however, we leave that decision to you.

Please understand that responses from your institution will be held in strict confidence. As with all our surveys, the data you provide will be reported in summary fashion only and will not be identifiable with your institution. This survey is authorized by the National Science Foundation Act of 1950, as amended. Although you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely.

Please return the completed questionnaire to us by February 23, 1981. A prepaid return envelope has been enclosed for your convenience. If you have any problems or questions, please do not hesitate to telephone us collect at 202-833-4757.

Sincerely,

Frank J. Atelsek

Frank J. Atelsek
Panel Director

OMB No. 099-R0265
Exp. 6/81

American Council on Education
Higher Education Panel Survey #53:

Sabbatical and Research Leaves in Colleges and Universities

A. POLICY ISSUES

1. Does your institution formally provide for sabbatical* leaves?

   ( ) No *If no, please skip questions 2-4 and go straight to question 5.*

   ( ) **Yes** *If yes,*
   Are sabbatical leaves **(Check only one)**:

   ( ) Negotiated separately as part of each individual's contract
   ( ) A benefit for which all eligible staff have equal opportunity in accordance with institutional policy or established practice
   ( ) Other (*please describe*) _____

2. Which of the following professional employees are eligible for sabbatical leave? **(Check all that apply)**

   ( ) full-time tenured faculty
   ( ) part-time tenured faculty
   ( ) full-time nontenured faculty
   ( ) part-time nontenured faculty
   ( ) administrative and other

3. How are sabbatical leaves given?

   ( ) automatically
   ( ) semi automatically (*please explain*)
   _____
   ( ) competitively
   ( ) other (*please explain*) _____

4. Typically, what proportion of support does your institution provide to a faculty member who is on sabbatical leave? *Please report percentage of salary and percentage of academic or contract year.*

   _____ percent of salary

   _____ percent of academic or contract year

5. Does your institution allow/offer leaves without pay to faculty members?

   ( ) No
   ( ) Yes *If yes,*
   For what professional or educational purposes may leaves without pay be granted? **(Check all that apply.)**

   ( ) research
   ( ) faculty development (related to teaching)
   ( ) other academic employment (including visiting professorships)
   ( ) nonacademic employment (*please describe*) _____
   ( ) other (*please describe*) _____

6. Does your institution plan to review or amend its current policy regarding sabbatical leaves within the next three years?

   ( ) No
   ( ) Yes ( ) will develop a policy regarding sabbaticals
   ( ) will liberalize eligibility requirements
   ( ) will liberalize terms of the sabbatical
   ( ) will restrict eligibility requirements
   ( ) will restrict terms of the sabbatical
   ( ) will terminate sabbaticals
   ( ) other (*please explain*) _____

*A *sabbatical* is a leave of absence to which faculty may become entitled after a fixed period of service and which is wholly or partly supported by the institution.

B. FULL-TIME HUMANITIES FACULTY

Be sure to include all persons with faculty rank even if they also hold administrative positions.

If full-time faculty members are assigned only part-time to the humanities, include them only if at least half of their teaching assignments are in the humanities.

7. How many full-time humanities faculty were employed at your institution during each of the following academic years?

Academic Year	Number of Full-time Humanities Faculty
1977-78	_____
1978-79	_____
1979-80	_____

Humanities include languages, both modern and classical; linguistics; literature; history; American studies; philosophy; archaeology; religious studies; and the history, criticism and theory of the arts.

8. How many full-time humanities faculty members have taken leave **for professional or educational reasons**--either sabbatical or without pay--for each of the following academic years?

Academic Year	Number Who Took Sabbatical Leave		Number Who Took Leave Without Pay	
	Partial Year	Full Year	Partial Year	Full Year
1977-78	_____	_____	_____	_____
1978-79	_____	_____	_____	_____
1979-80	_____	_____	_____	_____

Thank you for your assistance. Please return this form by **February 23, 1981** to:

Higher Education Panel
American Council on Education
One Dupont Circle, N.W.
Washington, D.C. 20036

Please keep a copy of this survey for your records.
Person completing form

Name _____

Dept. _____

Phone _____

If you have any questions or problems, please call the HEP staff collect at 202-833-4757

Appendix B: Technical Notes

Weighting

Data from the responding Panel institutions were statistically adjusted to represent the national population of institutions that had full-time humanities faculty. Excluded were independent medical schools, religious or Bible colleges, and certain other specialized institutions, such as engineering and business colleges. The stratification design for weighting follows.

Table B-1: Stratification Design

Cell	Category	Population	Respondents
01	Public universities	112	93
02	Private universities	71	59
04	Public black four-year colleges FTE > 3,000	12	7
05	Public nonblack four-year colleges FTE > 8,750	100	68
07	Private nonblack four-year colleges FTE > 8,750	11	9
08	Public two-year colleges FTE > 8,750	36	26
09	Public four-year colleges FTE 3,700-8,750	75	34
10	Public four-year colleges FTE < 3,700	163	26
11	Private four-year colleges FTE 2,000-8,750	119	31
12	Private four-year colleges FTE 1,000-2,000	255	36
13	Private four-year colleges FTE < 1,000	466	19
14	Public two-year colleges FTE 5,100-8,750	62	26
15	Public two-year colleges FTE 3,260-5,100	104	35
16	Public two-year colleges FTE 1,600-3,260	175	32
17	Public two-year colleges FTE < 1,600	496	32
18	Private two-year colleges	225	13

The weighting technique used was the standard one employed for full Panel surveys. Data received from Panel members were adjusted for item and institutional nonresponse within each cell. Then institutional weights were applied to bring the Panel data up to estimates representative of the national population.

Comparison of Respondents and Nonrespondents

Table B-2 compares survey respondents and nonrespondents against several variables. Higher-than-average responses rates were recorded for private institutions in general, universities, institutions in the Midwest and South, and those with undergraduate enrollments between 2,000 and 5,999 students. Public two-year and four-year institutions, large institutions, and those in the East and West had lower-than-average response rates.

Table B-2: Comparison of Respondents and Nonrespondents (in percentages)

Characteristic	Respondents (N=546)	Nonrespondents (N=127)	Response Rate
Total	100.0	100.0	81.1
Control			
Public	70.2	74.8	80.1
Private	29.8	25.2	83.6
Type and control			
Public universities	17.0	13.4	84.6
Private universities	10.8	8.7	84.3
Public four-year colleges	24.7	29.1	78.5
Private four-year colleges	17.4	14.2	84.1
Public two-year colleges	27.7	32.3	78.6
Private two-year colleges	2.4	2.4	81.2
Region			
East	24.5	31.5	77.0
Midwest	24.9	19.7	84.5
South	29.9	23.6	84.5
West	20.5	25.2	77.8
Total undergraduate enrollment (1976)			
less than 2,000	22.2	22.8	80.7
2,000 - 5,999	32.2	26.8	83.8
6,000 - 9,999	22.0	24.4	79.5
10,000 or more	23.6	26.0	79.6

Reliability of Survey Estimates

Since the statistics presented in this report are based on a sample, they will differ somewhat from the figures which would have been obtained if a complete census had been taken using the same survey instrument, instructions, and procedures. As in any survey, the results are also subject to reporting and processing errors and errors due to nonresponse. To the extent possible, these types of errors were kept to a minimum by methods built into the survey procedures.

The standard error is primarily a measure of sampling variability--that is, the variations that might occur by chance because only a sample of the institutions is surveyed. The chances are about 68 out of 100 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 90 out of 100 that it would be less than 1.65 times the standard error; about 95 out of 100 that it would be less than 1.96 times the standard error; and about 99 out of 100 that it would be less than 2.5 times as large. Thus, knowing the standard error permits us to specify a range within which we can have a stated confidence that a given estimate would lie if a complete census, rather than a sample survey, had been conducted. As an example, refer in table B-3 to the estimated number of all institutions that offer sabbatical leaves--1,846. The 90 percent confidence interval for that item is plus or minus 118. Thus, chances are about 90 out of 100 that a complete census would show the number of institutions that offer sabbatical leaves to be more than 1,728 and less than 1,964.

Table B-3 shows 90 percent confidence intervals of selected survey items for all institutions and for public and private institutions separately.

Table B-3: Ninety Percent Confidence Intervals of Selected Survey Estimates

Item	All Institutions		Public Institutions		Private Institutions	
	Estimate	Confidence Interval±	Estimate	Confidence Interval±	Estimate	Confidence Interval±
Institutions that offer sabbatical leaves	1,846	118	977	75	869	91
Institutions that offer leaves without pay	2,397	52	1,310	26	1,088	45
Full-time humanities faculty 1979-80	83,537	3,239	53,049	2,585	30,488	1,953
Number who took:						
partial year sabbaticals	3,884	512	2,301	427	1,583	283
full year sabbaticals	1,451	142	854	93	597	108
partial year leaves without pay	1,268	309	643	74	626	300
full year leaves without pay	1,579	163	971	99	608	130

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Other Reports of the Higher Education Panel
American Council on Education

El-Khawas, E. H. **College and University Facilities: Expectations of Space and Maintenance Needs for Fall 1974.** Higher Education Panel Report, No. 20, September, 1974.

Kinzer, J. L. and El-Khawas, E. H. **Compensation Practices for Graduate Research Assistants. A Survey of Selected Doctoral Institutions.** Higher Education Panel Report, No. 21, October, 1974.

El-Khawas, E. H. and Furniss, W. T. **Faculty Tenure and Contract Systems: 1972 and 1974.** Higher Education Panel Report, No. 22, December, 1974.

El-Khawas, E. H. and Kinzer, J. L. **A Survey of Continuing Education Opportunities Available to Nonacademic Scientists, Engineers and Mathematicians,** Higher Education Panel Report, No. 23, April, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Bachelor's Degrees Awarded to Minority Students, 1973-74.** Higher Education Panel Report, No. 24, January, 1977.

Atelsek, Frank J. and Gomberg, Irene L. **Nonfederal Funding of Biomedical Research and Development: A Survey of Doctoral Institutions.** Higher Education Panel Report, No. 25, July, 1975.

Gomberg, Irene L. and Atelsek, Frank J. **Major Field Enrollment of Junior-Year Students, 1973 and 1974.** Higher Education Panel Report, No. 26, April, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Student Assistance: Participants and Programs, 1974-75.** Higher Education Panel Report, No. 27, July, 1975.

Atelsek, Frank J. and Gomberg, Irene L. **Health Research Facilities: A Survey of Doctorate-Granting Institutions.** Higher Education Panel Report, No. 28, February, 1976.

Atelsek, Frank J. and Gomberg, Irene L. **Faculty Research: Level of Activity and Choice of Area.** Higher Education Panel Report, No. 29, January, 1976.

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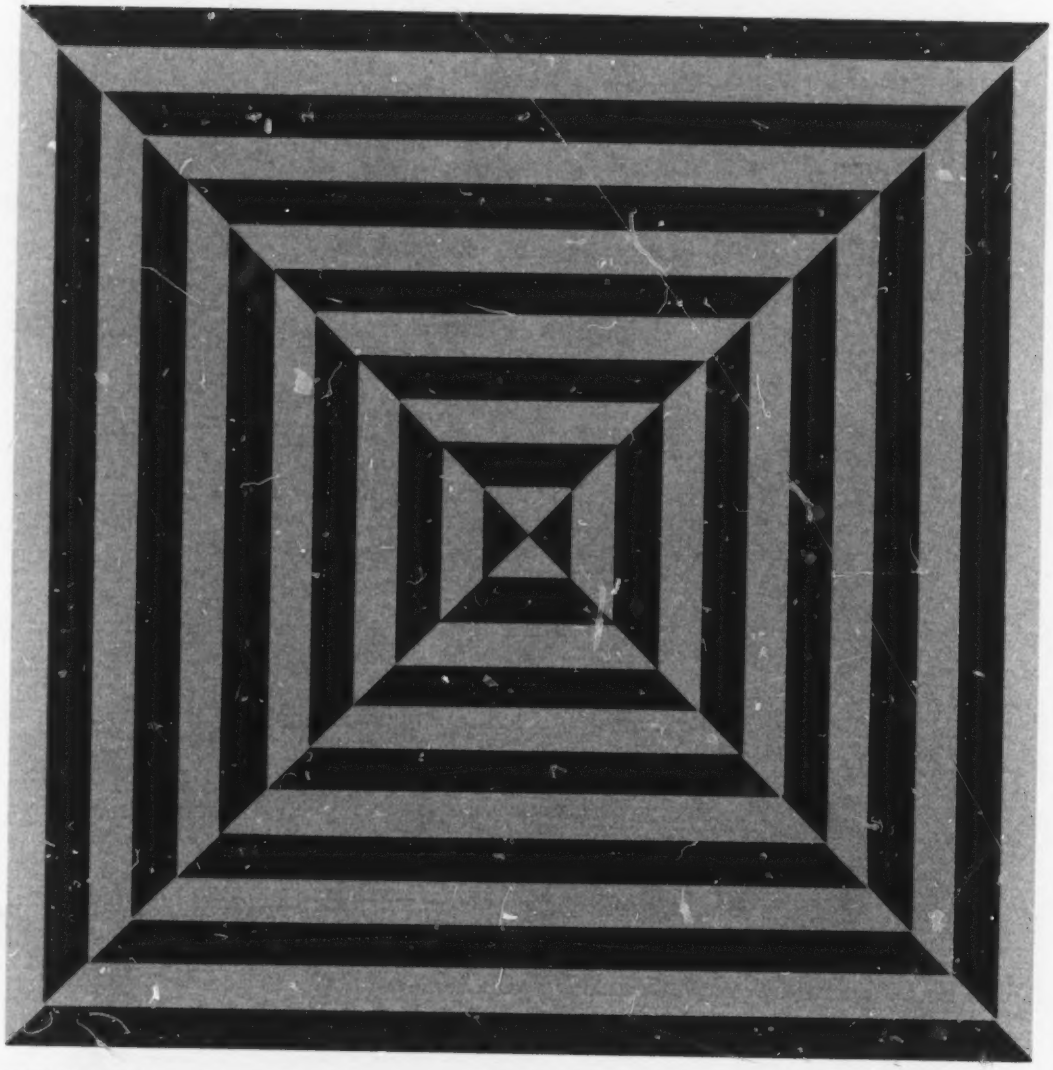
UNDERGRADUATE STUDENT CREDIT HOURS IN SCIENCE, ENGINEERING, AND THE HUMANITIES FALL 1980

Frank J. Atelsek and Charles J. Andersen



HIGHER EDUCATION PANEL REPORT NUMBER 54
AMERICAN COUNCIL ON EDUCATION

JUNE
1982

A Survey Funded by the National Science Foundation, the U. S. Department of Education, and the National Endowment for the Humanities

AMERICAN COUNCIL ON EDUCATION

J. W. Peltason, *President*

The American Council on Education, founded in 1918, is a council of educational organizations and institutions. Its purpose is to advance education and educational methods through comprehensive voluntary and cooperative action on the part of American educational associations, organizations, and institutions.

The Higher Education Panel is a survey research program established by the Council for the purpose of securing policy-related information quickly from representative samples of colleges and universities. *Higher Education Panel Reports* are designed to expedite communication of the Panel's survey findings to policy-makers in government, in the associations, and in educational institutions across the nation.

The Higher Education Panel's surveys on behalf of the Federal Government are conducted under contract support provided jointly by the National Science Foundation, the National Endowment for the Humanities, and the U. S. Department of Education (NSF Contract SRS-78-16385).

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Undergraduate Student Credit Hours in Science, Engineering, and the Humanities, Fall 1980

Frank J. Atelsek

Charles J. Andersen

Higher Education Panel Reports

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As is the case for the other studies in this series, we owe our primary debt and gratitude to our campus representatives who helped coordinate the survey and to the college and university staff members who provided the information for it.

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HIGHLIGHTS

- Nearly 49 million undergraduate student credit hours were taken in science, engineering, and engineering technology fields at the nation's colleges and universities in the first half of academic year 1980-81. Another 21 million were taken in four major fields of the humanities (English and American literature, history, modern languages, and philosophy).
- Seventy-six percent of the credit hours in the science, engineering, and engineering technology fields were taken at public institutions and the remaining 24 percent at private colleges and universities. In the four humanities fields, 73 percent were taken in the public sector and 27 percent in the private.
- More than three quarters (78 percent) of the credit hours in the science, engineering, and engineering technology fields were in lower division courses. For the four humanities fields, however, lower division courses accounted for nearly nine out of ten (87 percent) of the credit hours taken.

SCIENCE, ENGINEERING, AND ENGINEERING TECHNOLOGY

- Two-year colleges accounted for 38 percent of the lower division student credit hours in the ten science, engineering, and engineering technology fields; four-year colleges accounted for 33 percent, and the remaining 29 percent were taken at universities. Fifty-four percent of the upper division credits in these fields were taken at universities and 46 percent at four-year colleges.
- Of the ten science, engineering, and engineering technology fields surveyed, the basic social sciences reported the largest total of student credit hours (11.2 million). Mathematical sciences, with 9.8 million, and life sciences,

with 6.7 million, ranked second and third, respectively. Together, the three fields accounted for over half (57 percent) of the student credit hours reported in the ten fields.

- In lower division credit hours, the mathematical sciences ranked first with nearly 9 million. The basic social sciences (8.4 million) and life sciences (5.1 million) stood second and third, respectively.
- Engineering was the only field studied in which more credit hours were taken in the upper division (2.1 million) than in the lower (1.2 million).

HUMANITIES

- Two-year colleges accounted for 40 percent of the lower division student credit hours in the four humanities fields, four-year colleges accounted for 35 percent, and universities, 25 percent. Upper division credit hours were divided between universities and four-year colleges--42 percent taken at the universities and the remaining 58 percent at the four-year colleges. This is in sharp contrast to the distribution of upper division credit hours for science, engineering, and engineering technology with 54 percent taken at universities and only 46 percent at four-year colleges.
- English and American literature accounted for more than half (54 percent) of the credit hours reported in the four humanities fields surveyed.
- Of the 10.2 million lower division credit hours in English and American literature taken in the first half of last year, nearly half (48 percent) were taken in two-year colleges.

Overview

In sponsoring this survey, the National Science Foundation (NSF) and the National Endowment for the Humanities (NEH) sought to develop base line information about the amount and level of science, engineering, engineering technology, and humanities instruction being provided at various types of institutions. In particular, the sponsors were interested in obtaining information on the relative share of the instructional burden borne by two-year institutions. No alternative source existed for two-year colleges that was comparable, for example, to the bachelor's degree awards that permit instructional "burden" comparisons between four-year colleges and universities. Once a base line of these data is established, the Foundation, the Endowment, and other agencies will be able to track the changes in student course consumption among the fields within their purview. Prior to this survey, such tracking of students' academic activity has been confined to broad indicators that are less focused than credit hour information. Data about students' major fields or the disciplines in which baccalaureate degrees are awarded, for example, represent only broad aggregations of credit hours over many college terms. Obviously these proxies fail to provide information on student involvement in fields in which "minors" are declared, in "service courses," or in other required nonmajor courses within a degree program. Only a survey of credit hours taken during a specific term can reflect the full range of students' experience with academic course offerings.

This survey, then, provides a "snapshot" of the credit hour situation in the first half of academic year 1980-81, and it lays the foundation for future comparisons. It will be particularly helpful in the sciences, engineering, and engineering technology where its coverage of fields is quite complete. The

four humanities fields examined are major disciplines and account for over half of the humanities baccalaureates produced in recent years. Furthermore, these fields were selected to match those for which faculty data were gathered in an earlier HEP survey[1] sponsored by NEH. Thus, it should be possible to compare these two data sets subsequently.

The term "student credit hours" was, for the purposes of this survey, defined as "credit value of a course multiplied by the number of students registered for that course." Inasmuch as most institutions make their course registrations a matter of record after the twelfth class meeting, indications are that the data shown in this report represent the number of course credits taken, not the number offered or the number successfully completed.

The study obtained data for not only total credit hour estimates, but for lower and upper division credit hours separately. As will be seen later in this report, the distributions by level vary considerably from field to field and between types of institution. It should be noted here that the two-year colleges were directed to report all of their credit hours in the lower division. Although there is a movement at numerous two-year institutions to develop courses that are comparable to upper division work, estimating the prevalence of such activity was outside the scope of this survey.

Readers may be surprised by the large number of lower division credit hours taken in some of the fields surveyed (e.g., ninety percent of the credit hours in English and American literature). This, of course, is due to the vast numbers of students taking basic courses required in a wide variety of curricula.

---

1. HEP Survey No. 51. Selected Characteristics of Full-time Humanities Faculty, Fall 1979 (Washington: American Council Education, 1981).

Listed below are the fields of study included in this survey. For identification of subfields within each of the fields, see the second page of appendix A.

Science, engineering, and engineering technology

Chemistry
Computer science
Earth sciences
Engineering
Engineering technology
Life sciences
Mathematical sciences
Physics/astronomy
Psychology
Social sciences (basic)

Humanities

English and American literature
History
Modern languages
Philosophy

Methods Summary

The Higher Education Panel is a continuing survey research program created in 1971 by the American Council on Education to conduct specialized surveys on topics of current policy interest both to the higher education community and to government agencies.

The Panel is a stratified sample of 760 colleges and universities drawn from the population of more than 3,000 institutions listed in the National Center for Education Statistics' (NCES) Education Directory, Colleges and Universities. All institutions in the population are grouped according to the Panel's stratification design, which is based on three factors: institution type (whether a school is a university, four-year college, or two-year college), control or governance (whether it is public or private), and size (as measured by full-time-equivalent enrollment). For any given survey, either the entire Panel or an appropriate subgroup is used.

The survey instrument was mailed in June of 1981 to all Panel institutions that enroll undergraduate students. After mail and telephone

follow-ups were completed, responses were received from 563, or 81 percent, of the 698 institutions surveyed.

Among the 563 respondents, 65 reported that their institutions made no distinction between upper and lower division courses. In processing the survey, these 65 were treated as nonrespondents.

The differences between academic calendars (quarters, trimesters, semesters, etc.) were resolved by converting all credit hours to a semester credit basis. For institutions on the quarter plan, this meant extending the quarter credit data to one-half an academic year by multiplying them by one and one-half (half an academic year of three quarters). The resulting half-year's credit was then multiplied by two-thirds, which is the ratio between the normal credit requirements for a baccalaureate at a semester system institution and one at a quarter plan college. Because these two operations cancel each other, the figures provided by the quarter plan institutions fairly represent one-half year's effort at such institutions expressed in semester credits. Institutions with other than semester or quarter system calendars were dealt with individually to convert all credit hour information to a semester basis.

Data from responding institutions were statistically adjusted to represent the national population of 2,732 institutions that enroll undergraduates. Institutional weights were created for each stratification cell by computing the ratio of the number of institutions in the population to the number of institutions that responded.

Appendix B contains more detailed technical notes about: 1) the stratification and weighting design used to produce the national estimates in this report; 2) a comparison of selected institutional characteristics among respondents and nonrespondents; and 3) a tabular presentation and discussion of the confidence intervals for the credit hour estimates derived from the survey.

Findings

Two- and four-year colleges and universities "produced" the equivalent of nearly 70 million semester hours in the sciences, engineering, and engineering technology, and in four major humanities fields during the first half of the 1980-81 academic year. Analysis of the data by level of instruction shows that four-fifths (81 percent) of the credits were taken in lower division courses (table A). This proportion seems consistent with enrollment data from the National Center for Education Statistics (NCES) that reported that 71 percent

Table A

Credit Hours of Course Work Taken in Ten Science, Engineering, and Engineering Technology Fields and Four Humanities Fields, by Level of Instruction

Level of Instruction	Credit Hours	Percent
Total	69,931,000	100
Lower division	56,481,000	81
Upper division	13,450,000	19

of the undergraduate enrollees (full-time-equivalent enrollments) were in their first two years of college.[2]

The difference (71 percent vs. 81 percent) may be partly due to the selective nature of the fields of study included in this survey. Such fields as English and American literature, mathematical sciences, and modern languages, for example, include many "service" courses that students must take to meet institutional requirements for graduation. Students tend to take these required courses in their first two years of study.

2. National Center for Education Statistics, Fall Enrollment in Higher Education, 1978 (Washington: Government Printing Office, 1979), table 5.

In using these survey data, readers should remember that the figures do not represent all of the undergraduate course work offered at the nation's colleges and universities. Excluded from the survey were such areas of college offerings as education, business and commerce, and other nonscience fields, including specialty fields within the humanities.[3]

Type of Institution

Each of the three major components of the nation's postsecondary education system generated about one-third of the credits reported in the survey (table B). The four-year colleges, many of which are liberal arts institutions, accounted for the largest proportion of science, engineering,

Table B

Credit Hours of Course Work Taken in Ten Science, Engineering, and Engineering Technology Fields and Four Humanities Fields by Type of Institution

Type of Institution	Science, Engineering, and Engineering Technology		Humanities	
	Number (000's)	Percent	Number (000's)	Percent
All institutions	48,967	100	20,965	100
Universities	16,970	35	5,725	27
Four-year colleges	17,498	36	7,886	38
Two-year colleges	14,500	30	7,354	35

Note: In this and the following tables, detail may not sum to totals because of rounding.

engineering technology, and humanities credits (36 percent and 38 percent, respectively). It should be remembered that the fields included were predominately those that comprise the "arts and sciences" fields that have

3. A full listing of the specific fields included in this study is found in appendix A, Survey Instrument.

traditionally been the areas of concentration for the liberal arts institutions.

The universities accounted for just over one-third (35 percent) of the science, engineering, and engineering technology credits, but only 27 percent of the humanities credits. In contrast, two-year colleges reported a slightly smaller proportion (30 percent) of the credits in the former fields and 35 percent of the credit hours in the humanities.

When only the lower division credits were examined, the two-year colleges came to the forefront. Almost two-fifths (39 percent) of all such credits were taken at this type of institution. The proportion holds true generally for both major academic areas: 38 percent for science, engineering, and engineering technology lower division credit hours and 40 percent for humanities credits.

Control of Institution

Distribution of the credits by control of institution is shown in table C. About one-quarter are taken in the private sector and three-quarters in the public. This compares with enrollment figures from NCES showing a 24/76

Table C

Credit Hours of Course Work Taken in Ten Science, Engineering, and Engineering Technology Fields and Four Humanities Fields, by Control of Institution

Control	Science, Engineering, and Engineering Technology		Humanities	
	Number (000's)	Percent	Number (000's)	Percent
All institutions	48,967	100	20,965	100
Public	37,431	76	15,292	73
Private	11,535	24	5,673	27

percent division between private and public institutions for full-time-equivalent undergraduate enrollments.

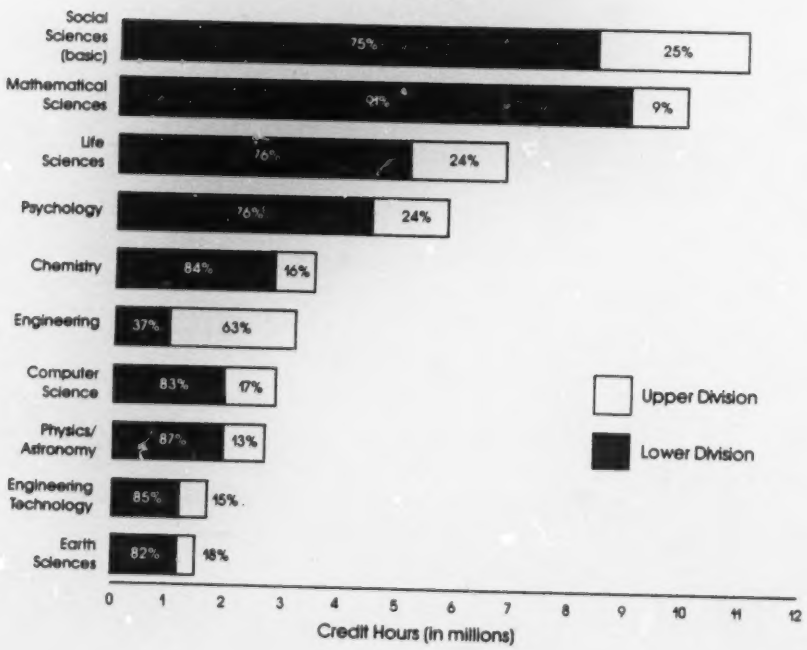
Fields of Study

The ten science, engineering, and engineering technology fields accounted for almost 49 million (70 percent) of the student credit hours covered by the survey. The preponderant majority (78 percent) of the credits taken were in lower division courses. As shown in figure 1, however, the split between lower and upper division credits varies widely among the fields. In the mathematical sciences, for example, fewer than 10 percent of the credit hours taken were in upper division courses, while more than three-fifths (63 percent) of the credit hours taken in engineering were in upper division courses. This, of course, is a result of the many "service" courses that are offered in the former field

Figure 1

Undergraduate Student Credit Hours in Ten Science, Engineering, and Engineering Technology Fields by Level of Instruction and Field of Study

Fall 1980



which are typically defined as lower division courses and taken in an early college year. Engineering, on the other hand, offers few, if any, service courses.

The basic social sciences, the life sciences, and the field of psychology also have an above-average share of credits taken in upper division courses (25 percent, 24 percent, and 24 percent respectively). While these fields have large components of service courses, it is also true that many students major in them and, therefore, one would expect an above-average array of upper division courses.

The 49 million credit hours taken in science, engineering, and engineering technology fields during the fall term of 1980 were distributed among the ten fields as follows:

	Percentage of Credit Hours
Basic social sciences	23
Math sciences	20
Life sciences	14
Psychology	12
Chemistry	7
Engineering	7
Computer science	5
Physics/astronomy	5
Engineering technology	3
Earth sciences	3
Total	100

Of the four humanities fields covered by the survey, English and American literature accounted for more than half of the student credit hours while philosophy represented only 9 percent:

	Percentage of Credit Hours
English and American literature	53
History	22
Modern languages	16
Philosophy	9
Total	100

Figure 2 shows how the humanities credit hours were distributed between lower and upper division courses. Of the more than 11 million credit hours in English and American literature, only 10 percent were taken in upper division courses. For history and philosophy, the proportion of upper division credit hours is considerably higher (18 percent), and for modern languages, the upper division percentage is in the mid-range (14 percent).

Differences Among Types of Institutions

When the survey data are analyzed by type of institution, even greater differences in credit hour distributions are evident, as shown in figures 3 through 6.

Sciences, Engineering, and Engineering Technology. The four-year colleges produced more basic social science credit hours than either the universities or the two-year colleges (see figure 3). This lead prevailed in three other fields--life sciences, psychology, and earth sciences. In all of the other fields, either the universities or two-year colleges produced more credit hours.

In both the university and four-year college sectors, the mathematical sciences were second to the basic social sciences. Again, the four-year

Figure 2

Undergraduate Student Credit Hours in
Four Humanities Fields
by Level of Instruction and Field of Study

Fall 1980

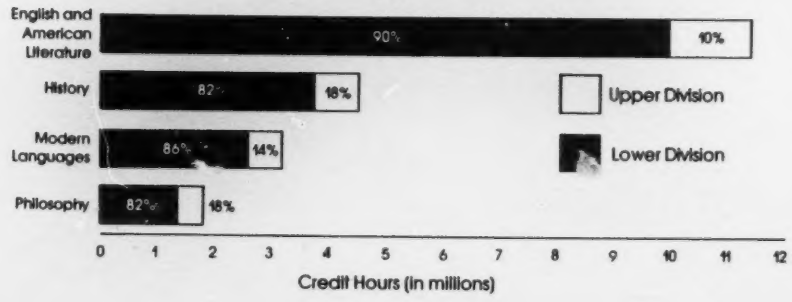
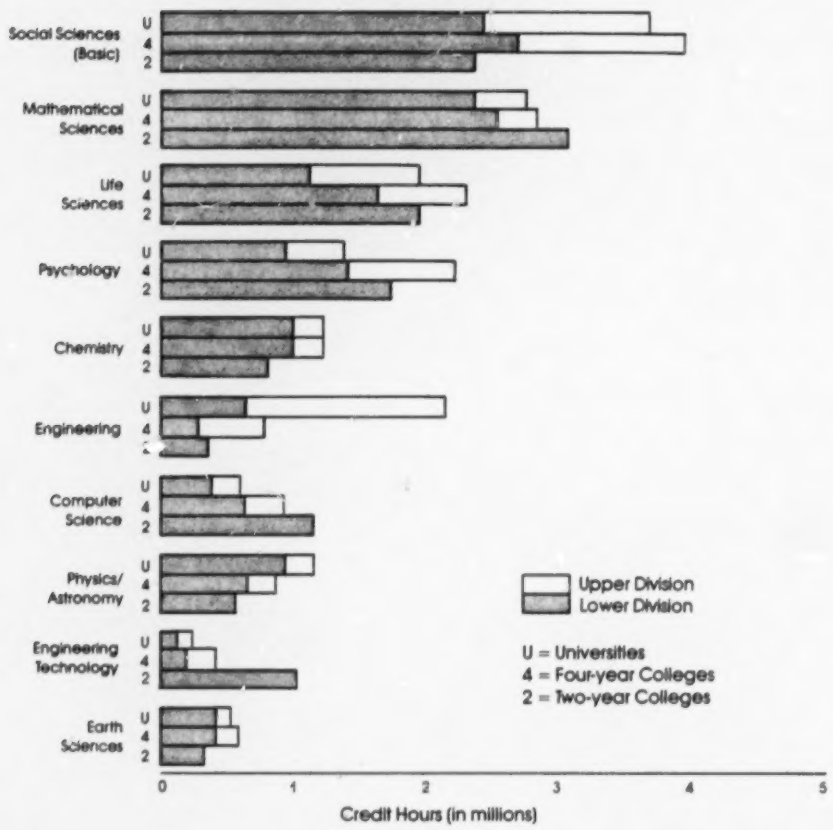


Figure 3

Undergraduate Student Credit Hours in
Ten Science, Engineering, and Engineering Technology Fields
by Level of Instruction, Field of Study and Type of Institution

Fall 1980



colleges outproduced the universities in terms of total credits. In all likelihood, this lead is a result of the proportionately larger undergraduate enrollments in the four-year colleges and the "service" nature of the field. Even more notable is that in the mathematical sciences, the two-year institutions outstripped both of the other sectors with about 3.5 million student credit hours taken. This may partly reflect the remedial emphasis adopted by many two-year colleges in recent years.

Two other results that stand out are the distributions of credit hours in engineering and engineering technology. Although the former ranks sixth among

the science, engineering, and engineering technology fields overall, in the university sector it ranks third, just below mathematical sciences. As mentioned in the previous section, the field is notable for its heavy concentration of upper division courses.

In the case of engineering technology, the ranking is ninth out of the 10 science, engineering, and engineering technology fields overall. But its position moves up to sixth in the two-year college sector, just below computer science. By far, the most student credit hours taken in this field (68 percent) are taken at two-year colleges.

Table D shows upper division student credit hours in each field as a percentage of all credit hours in the university and four-year college sectors separately. These percentages are remarkably close in most fields. Only in engineering, life sciences, and computer science do the percentages vary by ten or more percentage points.

Distribution of upper division credit hours between institutional types

Table D

Upper Division Student Credit Hours in Ten Science, Engineering, and Engineering Technology Fields as a Percentage of All Student Credit Hours in Each Field, by Type of Institution

Field	Percentages for	
	Universities	Four-year Colleges
Engineering	72	62
Engineering technology	48	48
Life sciences	43	29
Computer science	38	26
Social sciences (basic)	34	32
Psychology	32	38
Earth sciences	27	21
Chemistry	20	21
Mathematical sciences	14	13
Physics/astronomy	13	20

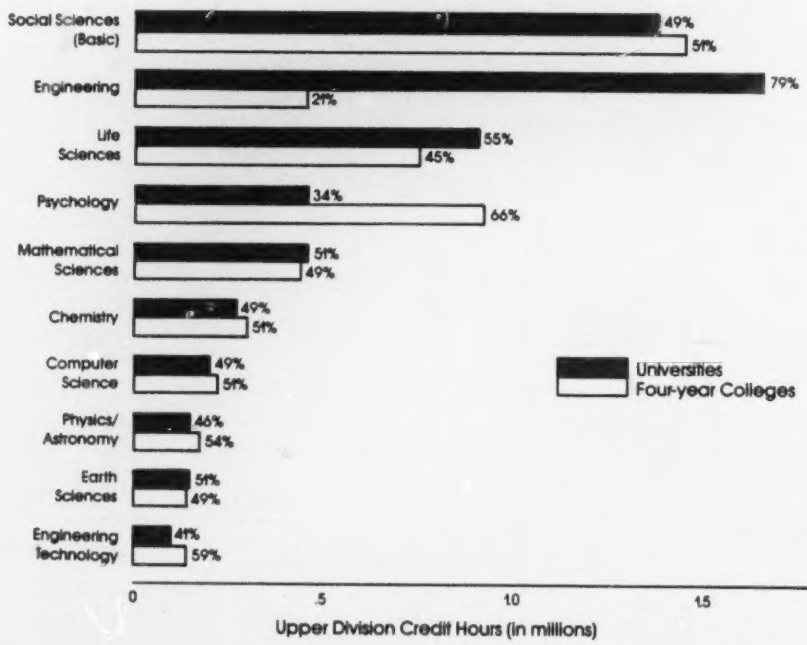
is shown in figure 4. In only two fields did the university sector produce a clear preponderance of such credit hours; in engineering, the universities accounted for nearly four-fifths (79 percent), and in life sciences they produced 55 percent. In five fields (social sciences, mathematical sciences, chemistry, computer science, and earth sciences), the split between universities and four-year colleges was almost even--between 49 and 51 percent for one sector or the other. In the remaining three fields (psychology, physics/astronomy, and engineering technology) the four-year college sector produced the clear majority of the upper division credit hours.

Humanities. Figure 5 shows the distribution of student credit hours in the four humanities fields surveyed, by level of instruction, type of

Figure 4

Upper Division Student Credit Hours in
Ten Science, Engineering, And Engineering Technology Fields
by Type of Institution

Fall 1980



Note: Fields of study are in rank order by total upper division credits taken.

institution, and field. It illustrates the heavy concentration of credit hours taken in English and American literature in each of the institutional sectors. It also shows that the largest number of credits in this field were taken in the two-year colleges. In history and philosophy, the four-year college sector shows the largest concentration of credit hours, whereas in modern languages, the universities show the heaviest concentration.

Figure 5

Undergraduate Student Credit Hours in
Four Humanities Fields
by Level of Instruction, Field of Study and Type of Institution

Fall 1980

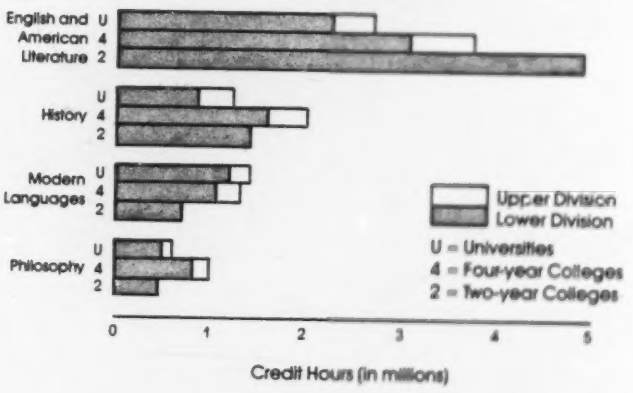


Table E shows the upper division credit hours as a percentage of the total taken in the university and four-year college sectors separately. As in the ten science, engineering, and engineering technology fields, the upper division proportions in each of the four humanities fields surveyed are very similar in the two types of institution. History was the field with the largest difference, with just under one-third (31 percent) of the credit hours taken in upper division courses at the universities. The corresponding figure for the four-year institutions was less than one-quarter (22 percent).

When upper division credit hours in the humanities are distributed between the universities and the four-year colleges, the latter turn out to be the

Table E

Upper Division Student Credit Hours in Four Humanities Fields as a Percentage of All Student Credit Hours in Each Field by Type of Institution

Field	Percentages for	
	Universities	Four-year Colleges
History	31	22
Philosophy	21	24
Modern languages	16	20
English & American literature	16	18

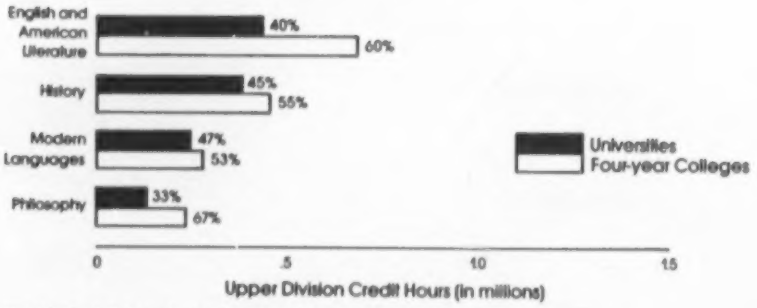
heavy producers in each of the four fields surveyed (see figure 6). This strength appears to reinforce the comments made earlier about the four-year colleges' concentration in the traditional liberal arts fields. It also differs from the pattern in the science, engineering, and engineering technology fields where, in only three out of ten disciplines, did the four-year college sector clearly outproduce the universities.

Top 50 Universities. The 50 universities that awarded the largest number of bachelor's degrees in 1977-78 accounted for 23 percent of all baccalaureates

Figure 6

Upper Division Student Credit Hours in Four Humanities Fields by Type of Institution

Fall 1980



Note: Fields of study are in rank order by total upper division credits taken.

that year. These same top 50 institutions accounted for slightly more than that percentage (26 percent) of upper division student credit hours taken in the fall of 1980 in the fourteen fields surveyed.

Figure 7 shows how the top 50 universities compare to all universities in proportions of upper division credits taken in the ten science, engineering, and engineering technology fields. The top 50 show greater proportions of upper division credits taken in all ten fields. This disparity is especially great in the following three fields.

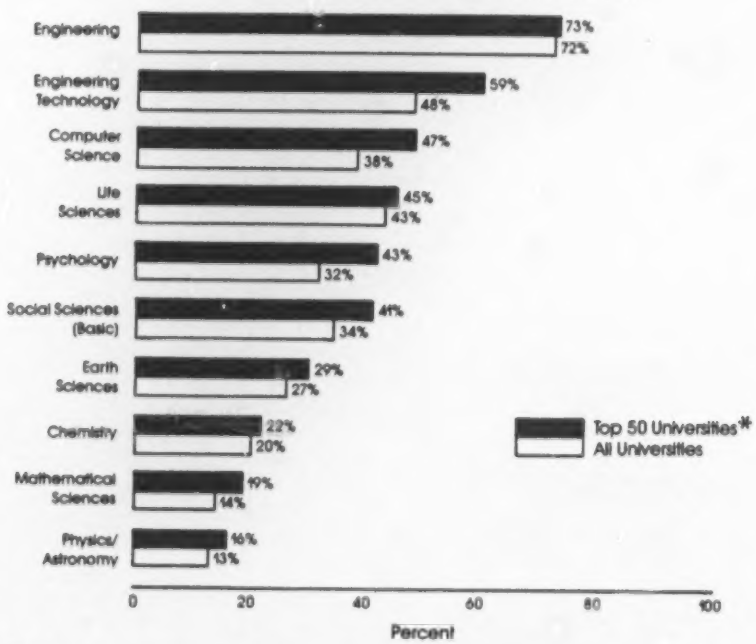
	Percentage for	
	Top 50 Universities	All Universities
Engineering technology	59	48
Computer science	47	38
Psychology	43	32

Figure 7

Upper Division Credit Hours
as a Percent of All Undergraduate Credit Hours in
Ten Science, Engineering, and Engineering Technology Fields
by Field of Study

Fall 1980

Top 50 Institutions* Compared with All Universities



*The 50 universities that awarded the largest number of bachelor's degrees in 1977-1978.

Engineering technology is a field usually associated with the two-year college. Indeed, 80 percent of the lower division credit hours in engineering technology are taken at public two-year colleges. The distribution of upper division credit hours, however, is another matter. Among universities, for example, their concentration is heavier in the top 50 universities (59 percent) than in the university sector as a whole. Survey data provide no definitive explanation for this; however, two factors should be pointed out. First, the number of upper division credit hours generated in this field is quite small--only a quarter of a million, or 2.3 percent of all such credits in the sciences, engineering, and engineering technology. Second, the field is growing rapidly. Eleven years ago only 5,100 bachelor's degrees were awarded in engineering technology, but in 1979-80, the total had grown to over 10,000; and thirty-six states had at least one institution that offered a bachelor's degree program in the field.[4]

The same pattern of differences is apparent among the four humanities fields surveyed (see figure 8). The proportion of credit hours taken in upper division courses, however, is notably smaller (a 27 percent average among the four humanities fields vs. a 39 percent average for science, engineering, and engineering technology credit hours). At the top 50 universities, history had the greatest proportion of credit hours taken in upper division courses (36 percent). English and American literature also had a relatively strong representation in upper division credit hours (26 percent at the top 50 universities compared to only 16 percent at universities taken as a whole).

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4. National Center for Education Statistics, Earned Degrees Conferred series (Washington, D.C.: Government Printing Office), 1970-71, p. 292; unpublished data for 1979-80.

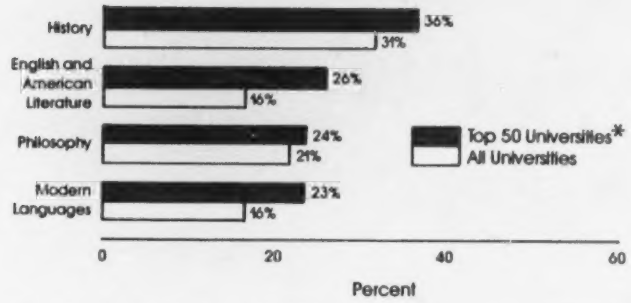
College Board, The College Handbook Index of Majors, (New York: College Board, 1977), p. 255.

Figure 8

Upper Division Credit Hours
as a Percent of All Undergraduate Credit Hours in
Four Humanities Fields
by Field of Study

Fall 1980

Top 50 Institutions* Compared with All Universities



*The 50 universities that awarded the largest number of bachelor's degrees in 1977-1978.

A Concluding Note

This survey is a first-time effort and as such only provides the initial base line data about undergraduate credit hours. The descriptive presentation of the survey results is relatively spare since there are no earlier data that provide a base for comparison. In future updates of these data, however, the sponsors will have an opportunity to analyze further how credit hour production shifts over time among the various types of institutions, as well as within and among each of the science, engineering, engineering technology, and humanities fields surveyed.

Detailed Statistical Tables

Note: In the following tables, detail may not sum to totals because of rounding.

Table 1

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

All Institutions

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	69,931	100.0	56,481	100.0	13,450	100.0
Subtotal for science, engineering, and engineering technology fields	48,967	70.0	38,226	67.7	10,741	79.9
Chemistry	3,503	5.0	2,957	5.2	547	4.1
Computer science	2,670	3.8	2,204	3.9	466	3.5
Earth sciences	1,567	2.2	1,280	2.3	287	2.1
Engineering	3,361	4.8	1,233	2.2	2,128	15.8
Engineering technology	1,615	2.3	1,366	2.4	249	1.9
Life sciences	6,745	9.6	5,109	9.0	1,637	12.2
Mathematical sciences	9,834	14.1	8,959	15.9	876	6.5
Physics/astronomy	2,656	3.8	2,322	4.1	334	2.5
Psychology	5,835	8.3	4,432	7.8	1,403	10.4
Social sciences (basic)	11,179	16.0	8,364	14.8	2,815	20.9
Subtotal for four humanities fields	20,965	30.0	18,256	32.3	2,709	20.1
English and American literature	11,267	16.1	10,166	18.0	1,101	8.2
History	4,538	6.5	3,738	6.6	800	5.9
Modern languages	3,289	4.7	2,822	5.0	467	3.5
Philosophy	1,871	2.7	1,529	2.7	341	2.5

Table 2

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

All Public Institutions

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	52,723	100.0	43,451	100.0	9,272	100.0
Subtotal for science, engineering, and engineering technology fields	37,431	71.0	29,838	68.7	7,593	81.9
Chemistry	2,640	5.0	2,262	5.2	378	4.1
Computer science	2,205	4.2	1,838	4.2	367	4.0
Earth sciences	1,299	2.5	1,058	2.4	241	2.6
Engineering	2,376	4.5	968	2.2	1,408	15.2
Engineering technology	1,516	2.9	1,326	3.1	190	2.1
Life sciences	5,288	10.0	4,050	9.3	1,238	13.4
Mathematical sciences	7,619	14.5	7,030	16.2	589	6.4
Physics/astronomy	1,881	3.6	1,685	3.9	195	2.1
Psychology	4,303	8.2	3,338	7.7	964	10.4
Social sciences (basic)	8,304	15.8	6,284	14.5	2,020	21.8
Subtotal for four humanities fields	15,292	29.0	13,613	31.3	1,679	18.1
English and American literature	8,684	16.5	7,956	18.3	728	7.9
History	3,325	6.3	2,809	6.5	517	5.6
Modern languages	2,182	4.1	1,904	4.4	278	3.0
Philosophy	1,100	2.1	944	2.2	156	1.7

Table 3

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

All Private Institutions

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	17,208	100.0	13,030	100.0	4,178	100.0
Subtotal for science, engineering, and engineering technology fields	11,535	67.0	8,387	64.4	3,148	75.4
Chemistry	863	5.0	695	5.3	168	4.0
Computer science	465	2.7	366	2.8	99	2.4
Earth sciences	268	1.6	223	1.7	45	1.1
Engineering	985	5.7	265	2.0	720	17.2
Engineering technology	99	0.6	41	0.3	58	1.4
Life sciences	1,457	8.5	1,058	8.1	398	9.5
Mathematical sciences	2,215	12.9	1,929	14.8	287	6.9
Physics/astronomy	775	4.5	636	4.9	139	3.3
Psychology	1,532	8.9	1,094	8.4	439	10.5
Social sciences (basic)	2,875	16.7	2,080	16.0	795	19.0
Subtotal for four humanities fields	5,673	33.0	4,643	35.6	1,030	24.6
English and American literature	2,583	15.0	2,210	17.0	373	8.9
History	1,212	7.0	929	7.1	283	6.8
Modern languages	1,107	6.4	919	7.1	188	4.5
Philosophy	770	4.5	585	4.5	185	4.4

Table 4

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

All Universities

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	22,694	100.0	15,785	100.0	6,909	100.0
Subtotal for science, engineering, and engineering technology fields	16,970	74.8	11,187	70.9	5,782	83.7
Chemistry	1,315	5.8	1,048	6.6	267	3.9
Computer science	607	2.7	377	2.4	230	3.3
Earth sciences	537	2.4	391	2.5	146	2.1
Engineering	2,327	10.3	652	4.1	1,675	24.2
Engineering technology	212	0.9	110	0.7	102	1.5
Life sciences	2,098	9.2	1,202	7.6	896	13.0
Mathematical sciences	3,112	13.7	2,667	16.9	445	6.4
Physics/astronomy	1,159	5.1	1,007	6.4	152	2.2
Psychology	1,492	6.6	1,011	6.4	481	7.0
Social sciences (basic)	4,112	18.1	2,724	17.3	1,388	20.1
Subtotal for four humanities fields	5,725	25.2	4,598	29.1	1,127	16.3
English and American literature	2,675	11.8	2,237	14.2	439	6.4
History	1,156	5.1	797	5.0	359	5.2
Modern languages	1,362	6.0	1,144	7.2	218	3.2
Philosophy	531	2.3	421	2.7	111	1.6

Table 5

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

Top 50 Universities[1]

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	9,530	100.0	6,095	100.0	3,436	100.0
Subtotal for science, engineering, and engineering technology fields	7,302	76.6	4,470	73.3	2,831	82.4
Chemistry	565	5.9	442	7.3	122	3.6
Computer science	276	2.9	145	2.4	131	3.8
Earth sciences	248	2.6	174	2.9	73	2.1
Engineering	922	9.7	252	4.1	670	19.5
Engineering technology	123	1.3	51	0.8	72	2.1
Life sciences	1,015	10.6	558	9.2	457	13.3
Mathematical sciences	1,279	13.4	1,040	17.1	239	7.0
Physics/astronomy	481	5.1	404	6.6	77	2.2
Psychology	635	6.7	364	6.0	271	7.9
Social sciences (basic)	1,758	18.4	1,040	17.1	719	20.9
Subtotal for four humanities fields	2,229	23.4	1,625	26.7	604	17.6
English and American literature	1,016	10.7	753	12.4	263	7.6
History	457	4.8	291	4.8	166	4.8
Modern languages	544	5.7	419	6.9	125	3.6
Philosophy	211	2.2	161	2.6	50	1.5

1. The 50 universities that awarded the largest number of bachelor's degrees in 1977-78.

Table 6

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

Public Universities

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	16,065	100.0	10,964	100.0	5,101	100.0
Subtotal for science, engineering, and engineering technology fields	12,249	76.2	8,002	73.0	4,246	83.2
Chemistry	1,002	6.2	803	7.3	199	3.9
Computer science	467	2.9	288	2.6	179	3.5
Earth sciences	464	2.9	335	3.1	129	2.5
Engineering	1,527	9.5	468	4.3	1,059	20.8
Engineering technology	184	1.1	101	0.9	83	1.6
Life sciences	1,724	10.7	975	8.9	748	14.7
Mathematical sciences	2,208	13.7	1,873	17.1	335	6.6
Physics/astronomy	751	4.7	643	5.9	109	2.1
Psychology	1,079	6.7	697	6.4	382	7.5
Social sciences (basic)	2,844	17.7	1,820	16.6	1,024	20.1
Subtotal for four humanities fields	3,817	23.8	2,962	27.0	855	16.8
English and American literature	1,766	11.0	1,415	12.9	352	6.9
History	825	5.1	565	5.2	260	5.1
Modern languages	874	5.4	706	6.4	168	3.3
Philosophy	352	2.2	276	2.5	76	1.5

Table 7

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

Private Universities

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	6,629	100.0	4,821	100.0	1,808	100.0
Subtotal for science, engineering, and engineering technology fields	4,721	71.2	3,185	66.1	1,536	85.0
Chemistry	313	4.7	245	5.1	68	3.7
Computer science	140	2.1	89	1.8	51	2.8
Earth sciences	73	1.1	56	1.2	18	1.0
Engineering	800	12.1	184	3.8	616	34.1
Engineering technology	29	0.4	9	0.2	19	1.1
Life sciences	375	5.6	226	4.7	148	8.2
Mathematical sciences	904	13.6	794	16.5	110	6.1
Physics/astronomy	407	6.1	364	7.6	43	2.4
Psychology	413	6.2	314	6.5	99	5.5
Social sciences (basic)	1,268	19.1	904	18.8	364	20.1
Subtotal for four humanities fields	1,908	28.8	1,636	33.9	272	15.0
English and American literature	909	13.7	822	17.1	87	4.8
History	331	5.0	231	4.8	100	5.5
Modern languages	489	7.4	439	9.1	50	2.8
Philosophy	179	2.7	144	3.0	35	1.9

Table 8

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

All Four-year Colleges

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	25,383	100.0	18,842	100.0	6,541	100.0
Subtotal for science, engineering, and engineering technology fields	17,498	68.9	12,539	66.5	4,959	75.8
Chemistry	1,313	5.2	1,033	5.5	280	4.3
Computer science	898	3.5	662	3.5	236	3.6
Earth sciences	678	2.7	537	2.9	141	2.2
Engineering	732	2.9	279	1.5	453	6.9
Engineering technology	308	1.2	161	.9	147	2.2
Life sciences	2,540	10.0	1,800	9.6	740	11.3
Mathematical sciences	3,225	12.7	2,795	14.8	430	6.6
Physics/astronomy	902	3.6	720	3.8	182	2.8
Psychology	2,446	9.6	1,523	8.1	922	14.1
Social sciences (basic)	4,456	17.6	3,029	16.1	1,427	21.8
Subtotal for four humanities fields	7,886	31.1	6,304	33.5	1,582	24.2
English and American literature	3,699	14.6	3,036	16.1	662	10.1
History	1,978	7.8	1,537	8.2	441	6.7
Modern languages	1,265	5.0	1,016	5.4	249	3.8
Philosophy	945	3.7	714	3.8	230	3.5

Table 9

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

Public Four-year Colleges

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	15,817	100.0	11,646	100.0	4,171	100.0
Subtotal for science, engineering, and engineering technology fields	11,365	71.9	8,018	68.8	3,347	80.2
Chemistry	811	5.1	632	5.4	179	4.3
Computer science	595	3.8	406	3.5	189	4.5
Earth sciences	515	3.3	402	3.5	113	2.7
Engineering	548	3.5	199	1.7	349	8.4
Engineering technology	238	1.5	130	1.1	108	2.6
Life sciences	1,613	10.2	1,123	9.6	490	11.7
Mathematical sciences	2,051	13.0	1,797	15.4	254	6.1
Physics/astronomy	559	3.5	473	4.1	86	2.1
Psychology	1,460	9.2	877	7.5	583	14.0
Social sciences (basic)	2,976	18.8	1,979	17.0	996	23.9
Subtotal for four humanities fields	4,452	28.1	3,628	31.2	824	19.8
English and American literature	2,179	13.8	1,803	15.5	377	9.0
History	1,180	7.5	923	7.9	257	6.2
Modern languages	672	4.2	562	4.8	110	2.6
Philosophy	421	2.7	341	2.9	80	1.9

Table 10

Undergraduate Student Credit Hours,
by Level of Instruction and Field of Study,
Fall 1980

Private Four-year Colleges

Field of Study	Total		Lower Division		Upper Division	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	9,566	100.0	7,196	100.0	2,370	100.0
Subtotal for science, engineering, and engineering technology fields	6,132	64.1	4,520	62.8	1,612	68.0
Chemistry	502	5.2	401	5.6	101	4.3
Computer science	303	3.2	256	3.6	47	2.0
Earth sciences	162	1.7	134	1.9	28	1.2
Engineering	184	1.9	80	1.1	104	4.4
Engineering technology	70	0.7	32	0.4	39	1.6
Life sciences	927	9.7	676	9.4	250	10.5
Mathematical sciences	1,174	12.3	998	13.9	177	7.5
Physics/astronomy	343	3.6	247	3.4	96	4.1
Psychology	986	10.3	647	9.0	339	14.3
Social sciences (basic)	1,481	15.5	1,050	14.6	431	18.2
Subtotal for four humanities fields	3,434	35.9	2,676	37.2	758	32.0
English and American literature	1,519	15.9	1,234	17.1	286	12.1
History	798	8.3	614	8.5	184	7.8
Modern languages	593	6.2	455	6.3	139	5.9
Philosophy	524	5.5	374	5.2	150	6.3

Table 11

Lower Division Student Credit Hours at Two-year Colleges, by Field of Study and Control of Institution, Fall 1980

Field of Study	Total		Public		Private	
	Number (000's)	Percent	Number (000's)	Percent	Number (000's)	Percent
All Fields	21,854	100.0	20,841	100.0	1,013	100.0
Subtotal for science, engineering, and engineering technology fields	14,500	66.3	13,818	66.3	682	67.3
Chemistry	876	4.0	827	4.0	48	4.7
Computer science	1,166	5.3	1,144	5.5	22	2.2
Earth Sciences	353	1.6	320	1.5	32	3.2
Engineering	302	1.4	301	1.4	1	0.1
Engineering technology	1,095	5.0	1,095	5.3	0	0.0
Life sciences	2,107	9.6	1,952	9.4	156	15.4
Mathematical sciences	3,497	16.0	3,360	16.1	137	13.5
Physics/astronomy	595	2.7	570	2.7	25	2.5
Psychology	1,898	8.7	1,764	8.5	133	13.1
Social sciences (basic)	2,611	11.9	2,485	11.9	127	12.5
Subtotal for four humanities fields	7,354	33.7	7,023	33.7	331	32.7
English and American literature	4,893	22.4	4,739	22.7	154	15.2
History	1,404	6.4	1,321	6.3	84	8.3
Modern languages	662	3.0	636	3.1	25	2.5
Philosophy	395	1.8	327	1.6	67	6.6

Note: Two-year colleges were instructed to report all student credit hours in the lower division.

Appendix A

Survey Instrument

AMERICAN COUNCIL ON EDUCATION
ONE DUPONT CIRCLE
WASHINGTON, D. C. 20036

HIGHER EDUCATION PANEL

June 19, 1981

Dear Higher Education Panel Representative:

Attached is the 54th Higher Education Panel survey, sponsored jointly by the National Science Foundation and the National Endowment for the Humanities. Entitled "Undergraduate Instruction in Science, Engineering, and the Humanities," its purpose is to assess the amount and level of undergraduate teaching in these fields. The findings will assist both NSF and NEH in planning programs and establishing priorities affecting instruction in the sciences and the humanities.

As a result of an earlier field test, we learned that most institutions will be able to provide the requested student credit hour information from a central source, usually the office of institutional research. However, as usual, we leave that decision to you.

Please understand that responses from your institution will be held in strict confidence. As with all our surveys, the data you provide will be reported in summary fashion only and will not be identifiable with your institution. This survey is authorized by the National Science Foundation Act of 1950, as amended. Although you are not required to respond, your cooperation is needed to make the results comprehensive, reliable, and timely.

Please forward the completed questionnaire to us by July 10,1981. If you have any problems or questions, please do not hesitate to telephone us collect at 202-833-4757.

Thank you for your cooperation and assistance.

Sincerely,

Frank J. Atelsek
Panel Director

FIELDS OF SCIENCE AND ENGINEERING

Please report on undergraduate instruction in the fields listed below. The listing of subfields is illustrative rather than exhaustive. Your institution may have a different classification of subfields within a major discipline. If instruction in a department, college, or division is offered in more than one major discipline (e.g., engineering, life sciences), information should be reported separately for each major discipline. In particular, computer science instruction should be reported separately, whether it is in the department of mathematics, college of engineering, or other organizational unit.

CHEMISTRY
- Analytical
- Environmental sciences (chemistry)
- General chemistry
- Organic
- Physical
- Chemistry, other

COMPUTER SCIENCE
- Theoretical computer science
- Software systems science
- Software engineering
- Intelligent systems
- Computer systems design
- Computer science, other

EARTH SCIENCES
- Environmental sciences (earth sciences)
- Geochemistry
- Geography (physical)
- Geology
- Geophysics
- Earth sciences, other

ENGINEERING
- Aeronautical
- Bioengineering
- Chemical
- Civil
- Electrical
- Engineering science
- Environmental sciences (engineering)
- Industrial
- Materials
- Mechanical
- Metallurgical
- Nuclear
- Petroleum
- Sanitary
- Engineering, other

ENGINEERING TECHNOLOGY

LIFE SCIENCES
- Agriculture (except agricultural economics)
- Anatomy
- Biochemistry
- Botany (including plant physiology)
- Cellular biology
- Ecology
- Entomology
- Environmental sciences (life)
- General biology
- Genetics
- Horticulture
- Microbiology
- Molecular biology
- Physiology
- Soil science
- Zoology
- Life sciences, other

MATHEMATICAL SCIENCES
- Algebra or number theory
- Applications of mathematics (including biometrics and biostatistics)
- Calculus
- Geometry
- Introductory college mathematics
- Logic or foundation of mathematics
- Probability and statistics
- Mathematics, other

PHYSICS/ASTRONOMY
- Acoustics
- Atomic and molecular
- Environmental sciences (physics)
- General physics
- Nuclear
- Optics
- Solid state
- Theoretical physics
- Physics, other
- Astronomy
- Atmospheric sciences (excluding meteorology)
- Metallurgy (excluding met. engineering)
- Meteorology

PSYCHOLOGY (excluding clinical)
- Developmental
- Environmental sciences (behavioral)
- Experimental, comparative or physiological
- General psychology
- Psychometrics
- Social
- Psychology, other

SOCIAL SCIENCES (BASIC)
- Agricultural economics
- Anthropology
- Archaeology
- Economics (excluding business administration)
- Environmental sciences (social)
- Geography (other than physical)
- History and philosophy of science
- Linguistics
- Political science
- Sociology (not including social work)
- Social sciences, other

HUMANITIES FIELDS

Please report on undergraduate instruction in only the fields listed below.

ENGLISH AND AMERICAN LITERATURE
- include comparative literature, writing, or other courses within the English department

HISTORY

MODERN LANGUAGES
- Romance (Italian, French, Portuguese, Spanish), Germanic and Slavic only.

PHILOSOPHY
- exclude religion

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exp. 6/81

American Council on Education
Higher Education Panel Survey Number 54:

UNDERGRADUATE INSTRUCTION IN SCIENCE, ENGINEERING, AND THE HUMANITIES,
FALL TERM 1980

Two-year colleges should normally report all student credit hours as lower division.

Do not complete this questionnaire if your institution has a four-year undergraduate program *but does not distinguish between upper and lower division courses.*
Please check here and return this form to us. ( )

Before completing this questionnaire, please read carefully all instructions and definitions.

All Undergraduate Courses in:	Number of Student Credit Hours[a] in: Lower Division[b] Undergraduate Courses	Upper Division[c] Undergraduate Courses
SCIENCE AND ENGINEERING		
CHEMISTRY		
COMPUTER SCIENCE		
EARTH SCIENCES		
ENGINEERING		
ENGINEERING TECHNOLOGY		
LIFE SCIENCES		
MATHEMATICAL SCIENCES		
PHYSICS/ASTRONOMY		
PSYCHOLOGY		
SOCIAL SCIENCES (BASIC)		
HUMANITIES		
ENGLISH AND AMERICAN LITERATURE		
HISTORY		
MODERN LANGUAGES		
PHILOSOPHY		

What is the academic calendar of your institution? ( )semester ( )quarter ( )other (specify)_____

Definitions:

Student credit hours- the credit value of a course multiplied by the number of students registered for that course

Lower division courses- courses ordinarily open to undergraduates in the first two years of a four-year curriculum : two-year colleges should report all data here

Upper division courses- courses ordinarily open to undergraduates during the third and fourth years of a four-year curriculum

Thank you for your assistance. Please return this form by July 10, 1981 to:

Higher Education Panel
American Council on Education
One Dupont Circle, N.W. (#829)
Washington, D.C. 20036

Please keep a copy of this survey for your records.

Person completing form

Name_____

Dept._____

Phone_____

If you have any questions or problems, please call the HEP staff collect at (202)833-4757.

(See opposite page for fields)

Appendix B

Technical Notes

Weighting

Data from the responding panel institutions were statistically adjusted to represent the national population of institutions that enroll undergraduate students. Excluded were independent medical schools and certain other institutions that provide only post-baccalaureate instruction. These exclusions resulted in a total of 698 panel institutions with undergraduate courses. Responses were received from 563 institutions, of which 65 indicated that they made no distinction between lower and upper division courses. Such institutions were treated as nonrespondents in the weighting procedures. The following table shows the weighting design, including the estimated population, the total number of respondents, and the number of respondents that made a distinction between lower and upper division courses.

Table B-1

Stratification Design

Cell	Type of Institution	Population	Respondents	
			Total	With Upper & Lower Div. Courses
	Total	2,732	563	498
01	Public universities	111	102	99
02	Private universities	72	59	37
04	Public black four-year colleges FTE > 3,000	13	7	7
05	Public nonblack four-year colleges FTE > 8,750	106	83	79
07	Private nonblack four-year colleges FTE > 8,750	12	6	5
08	Public two-year colleges FTE > 8,750	35	21	21
09	Public four-year colleges FTE 3,700-8,750	77	36	35
10	Public four-year colleges FTE < 3,700	178	29	26
11	Private four-year colleges FTE 2,000-8,750	131	34	26
12	Private four-year colleges FTE 1,000-2,0000	276	39	25
13	Private four-year colleges FTE < 1,000	660	24	16
14	Public two-year colleges FTE 5,100-8,750	62	26	25
15	Public two-year colleges FTE 3,260-5.100	102	28	28
16	Public two-year colleges FTE 1,600-3,260	173	29	29
17	Public two-year colleges FTE < 1,600	498	30	30
18	Private two-year colleges	226	10	10

The weighting technique used was the standard one employed for full Panel surveys. Data received from Panel members were adjusted for item and institutional nonresponse within each cell. Then insitutional weights were applied to bring the Panel data up to estimates representative of the national population.

Comparison of Respondents and Nonrespondents

Table B-2 compares survey respondents and nonrespondents against several variables. Higher-than-average response rates were recorded for both public and private universities, public four-year colleges, institutions in the Midwest and South, and those with undergraduate full-time-equivalent (FTE) enrollments above 7,400 students. Two-year colleges, private four-year colleges, institutions with FTE enrollments of 7,400 or less, and those in the West had lower-than-average response rates.

Table B-2

Comparison of Respondents and Nonrespondents
(In percentages)

Characteristic	Respondents (N=563)	Nonrespondents (N=135)	Response Rate
Total	100.0	100.0	80.7
Control			
Public	69.4	67.4	81.1
Private	30.6	32.6	79.6
Type and control			
Public universities	18.1	5.2	93.6
Private universities	10.5	7.4	85.5
Public four-year colleges	27.5	18.5	86.1
Private four-year colleges	18.3	19.3	79.8
Public two-year colleges	23.8	43.7	69.4
Private two-year colleges	1.8	5.9	55.6
Region			
East	24.9	24.4	80.9
Midwest	30.2	26.7	82.5
South	25.9	20.0	84.4
West	19.0	28.9	73.3
Total undergraduate full-time-equivalent enrollment (1976)			
Less than 500	5.5	10.4	68.9
500 - 7,400	63.4	74.1	78.1
7,401 - 17,000	25.4	14.1	88.3
17,001 or more	5.7	1.5	94.1

Note: All percentages were calculated from total responses, including those from institutions that were unable to distinguish between upper and lower division courses.

Reliability of Survey Estimates

Since the statistics presented in this report are based on a sample, they will differ somewhat from the figures which would have been obtained if a

complete census had been taken using the same survey instrument, instructions, and procedures. As in any survey, the results are also subject to reporting and processing errors and errors due to nonresponse. To the extent possible, these types of errors were kept to a minimum by methods built into the survey procedures.

The standard error is primarily a measure of sampling variability--that is, the variations that might occur by chance because only a sample of the institutions is surveyed. The chances are about 68 out of 100 that an estimate from the sample would differ from a complete census by less than the standard error. The chances are about 90 out of 100 that it would be less than 1.65 times the standard error; about 95 out of 100 that it would be less than 1.96 times the standard error; and about 99 out of 100 that it would be less than 2.5 times as large. Thus, knowing the standard error permits us to specify a range within which we can have a stated confidence that a given estimate would lie if a complete census, rather than a sample survey, had been conducted. As an example, refer in table B-3 to the estimated number of credit hours in lower division chemistry taken at all institutions--2,957,000. The 90 percent confidence interval for that item is plus or minus 120,000. Thus, chances are about 90 out of 100 that a complete census would show the number of credit hours would be more than 2,837,000 and less than 3,077,000.

Table B-3 shows 90 percent confidence intervals of selected survey items for all institutions and for several institutional types separately.

Table B-3

Ninety Percent Confidence Intervals for Selected Survey Estimates, by Type of Institution
(In thousands of student credit hours)

Discipline/Division	Credit Hours Estimate	Credit Hours Confidence Intervals±	Credit Hours Estimate	Credit Hours Confidence Intervals±	Credit Hours Estimate	Credit Hours Confidence Intervals±
	All Institutions		Universities		All 4-year Colleges	
Chemistry, lower division	2,957	120	1,048	54	1,033	69
Computer science, upper division	466	30	230	14	236	27
Engineering, upper division	2,128	396	1,675	392	453	61
English, lower division	10,166	1,656	2,237	572	3,036	197
History, upper division	800	46	359	25	441	39
Physics, lower division	2,322	198	1,007	161	720	90
Social sciences, lower division	8,364	546	2,724	417	3,029	205

	Large 4-year Colleges		Small 4-year Colleges		All 2-year Colleges	
Chemistry, lower division	374	19	657	66	876	84
Computer science, upper division	119	13	116	24	na	na
Engineering, upper division	275	28	169	56	na	na
English, lower division	975	40	2,054	193	4,893	1,549
History, upper division	144	10	296	38	na	na
Physics, lower division	288	18	432	89	595	81
Social sciences, lower division	1,208	54	1,817	198	2,611	298

na: Not applicable

Other Reports of the Higher Education Panel
American Council on Education

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Atelsek, Frank J. and Gomberg, Irene L. **Refund Policies and Practices of Colleges and Universities.** Higher Education Panel Report, No. 46, February 1980.

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